

H12077

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

DESCRIPTIVE REPORT

Type of Survey HYDROGRAPHIC
Field No. RA-40-04-09
Registry No. H12077

LOCALITY

State Alaska
General Locality Pavlof Islands
Sublocality East of Ukolnoi Island

2009

CHIEF OF PARTY

..... Captain Donald W. Haines, NOAA

LIBRARY & ARCHIVES

DATE

<p style="text-align: center;">U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION</p> <p style="text-align: center;">HYDROGRAPHIC TITLE SHEET</p>	<p>REGISTRY No</p> <p style="text-align: center;">H12077</p>
<p>INSTRUCTIONS – The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.</p>	<p>FIELD No:</p> <p style="text-align: center;">RA-40-04-09</p>
<p>State <u>Alaska</u></p> <hr/> <p>General Locality <u>Pavlof Islands</u></p> <hr/> <p>Sub-Locality <u>East of Ukolnoi Island</u></p> <hr/> <p>Scale <u>1:40,000</u> Date of Survey <u>June 18, 2009 - August 4, 2009</u></p> <hr/> <p>Instructions dated <u>5/4/2009</u> Project No. <u>OPR-P184-RA-09</u></p> <hr/> <p>Vessel(s) <u>RA1 (1101), RA2 (1103), RA4 (2801), RA5 (2802), RA3 (2803) RA6 (2804)</u></p> <hr/> <p>Chief of party <u>Captain Donald W. Haines, NOAA</u></p> <hr/> <p>Surveyed by <u>RAINIER Personnel</u></p> <hr/> <p>Soundings by <u>Reson SeaBat 7125, Tilted Reson SeaBat 8125, Knudsen 320M</u></p> <hr/> <p>SAR by <u>Tyanne Faulkes</u> Compilation by <u>Katie Reser</u></p> <hr/> <p>Soundings compiled in <u>Fathoms</u></p>	
<p>REMARKS: <u>All times are UTC. UTM Zone 4N.</u></p> <hr/> <p><u>The purpose of this survey is to provide contemporary surveys to update</u></p> <hr/> <p><u>National Ocean Service (NOS) nautical charts.</u></p> <hr/> <p><u>Revisions and end notes in red were generated during office processing.</u></p> <hr/> <p><u>Page numbering may be interrupted or non sequential.</u></p> <hr/> <p><u>All pertinent records for this survey, including the Descriptive Report, are archived at the</u></p> <hr/> <p><u>National Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/.</u></p>	

Descriptive Report to Accompany Hydrographic Survey H12077

Project OPR-P184-RA-09
Pavlof Islands, Alaska
East of Ukolnoi Island
Scale 1:40,000
June – August 2009
NOAA Ship *Rainier* (s221)
Chief of Party: Captain Donald W. Haines, NOAA

A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Project Instructions OPR-P184-RA-09 dated May 4, 2009 and all other applicable direction¹, with the exception of deviations noted in this report. The survey area is East of Ukolnoi Island, Alaska and corresponds to sheet “A” in the sheet layout provided with the Project Instructions. The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts.

Complete multibeam echosounder (MBES) coverage was achieved in the survey area in waters 8 meters and deeper. In depths less than 8 meters additional MBES coverage was acquired to identify least depths over significant features or shoals, as appropriate for this survey. Additional multibeam coverage was achieved in water depths between 8 and 4 meters that meet or exceed the project instruction requirements. Total mileage acquired by each vessel and system is referenced in Table 1.

Data Acquisition Type	Hull Number with Mileage (nm)							Total
	1101	1103	2801	2802	2803	2804	S221	
VBES (main scheme)	-	-	-	-	-	-	-	-
MBES (main scheme)	16.51	-	170.58	109.22	154.22	176.36	-	626.89
SSS (main scheme)	-	-	-	-	-	-	-	-
Crosslines	-	-	10.68	-	-	-	-	10.68
Developments	1.31	-	-	-	-	0.2	-	1.51
Shoreline	-	-	-	-	-	-	-	-
Bottom Samples	-	-	-	-	-	-	13	13
Total Number of Items Investigated	5	-	-	-	-	-	-	5
Total Area Surveyed (sq. nm)	-	-	-	-	-	-	-	33.97

Table 1: Statistics for survey H12077

Limited Shoreline Verification was performed for the survey area seaward of the Navigable Area Limit Line (NALL) for H12077, as per section 3.5.5 of the Field Procedures Manual April 2009 (FPM). Shoreline features were given S-57 attribution and included for submission in Notebook HOB files.

¹ NOS Hydrographic Surveys Specifications and Deliverables (April 2009), OCS Field Procedures Manual for Hydrographic Surveying (April 2009), and all Hydrographic Surveys Technical Directives issued through the dates of data acquisition.

Data acquisition was conducted from June 18 to August 4, 2009 (DN 169 to 216).

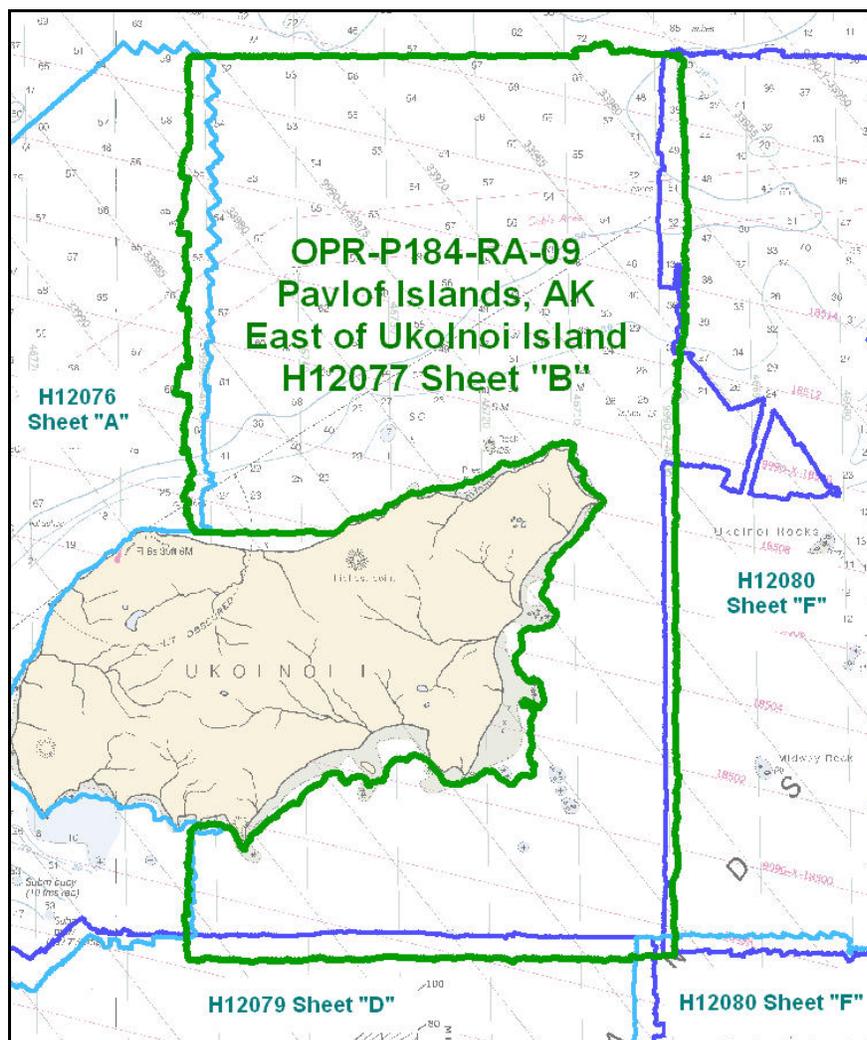


Figure 1: H12077 Survey Outline and Junctions

B. DATA ACQUISITION AND PROCESSING

A complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods can be found in the *OPR-P184-RA-09 Data Acquisition and Processing Report (DAPR)*, submitted under separate cover. Items specific to this survey, and any deviations from the DAPR are discussed in the following sections.

Final Approved Water Levels have been applied to this survey. See Section C. for additional information.

B.1. Equipment and Vessels

Data for this survey were acquired by the following vessels:

Hull Number	Name	Length (ft)	Draft (ft)	Acquisition Type
S221	<i>Rainier</i>	231	15.5	Bottom Samples
1101	RA-1	29	2	Reson 8125 Multibeam Echosounder
1103	RA-2	29	2	Knudsen 320M Vertical Beam Echosounder Detached Positions
2803	RA-3	29	3.5	Reson 7125 Multibeam Echosounder
2801	RA-4	29	3.5	Reson 7125 Multibeam Echosounder
2802	RA-5	29	3.5	Reson 7125 Multibeam Echosounder
2804	RA-6	29	3.5	Reson 7125 Multibeam Echosounder

Table 2: Data acquisition vessels and systems for H12077

Sound speed profiles were measured in accordance with the Specifications and Deliverables using SEACAT SBE-19 and 19+ profilers, as well as the Brooke Ocean Technology Moving Vessel Profiler.

Multibeam vessel navigation and attitude data were measured and recorded using Applanix POS/MV 320 systems, version 4. Vertical Beam echosounder navigation and attitude data were measured using a Trimble DSM212L GPS receiver and a TSS MAHRS system.

A complete description of survey vessels, hardware, and software systems is included in the *OPR-P184-RA-09 DAPR*.

No unusual vessel configurations were used for data acquisition.

B.2. Quality Control

B.2.a. Crosslines

Multibeam Echosounder (MBES) crosslines totaled 10.68 nautical miles, comprising 1.75% of main scheme MBES hydrography. *Rainier* was unable to achieve at least 5% multibeam crossline data due to time constraints and rough weather. The main scheme bathymetry was manually compared to the crossline nadir beams in CARIS subset editor. Comparison yielded excellent agreement with no discernable offsets.¹

A statistical Quality Control Report has been conducted on representative data acquired with each system used on this survey. Results of these tests are included in the updated 2009 *Rainier* Hydrographic System Readiness Review package submitted with this survey.

B.2.b. Final Uncertainty

Uncertainty values of submitted, finalized grids are calculated in CARIS using the “Greater of the Two” of total propagated uncertainty and standard deviation (scaled to 95%). An “IHOness” attribute layer was created for H12077’s finalized combined surface (H12077_8m_combined) in CARIS HIPS for analysis. Throughout the majority of the survey

area, uncertainty values for H12077 fall below the IHO levels as described in the NOS Specifications and Deliverables.² The exception to these results occurred along the very near-shore areas when using the tilted Reson 8125 sonar configuration; refer to OPR-P184-RA-09 Data Acquisition and Processing Report for specifics.

B.2.c. Junctions

Survey H12077 junctions with H12076, H12078, H12079, and H12081, which are sheets A, C, D, and F of the same project, respectively.³ The area of overlap between the sheets was reviewed in CARIS subset editor for consistency and data for all sheets were found to be in excellent agreement with no discernable offsets.⁴ The sheet limits and area of overlap for all sheet junctions are shown in Figure 1.

Junction Survey	Survey Scale	Date of Survey	Survey Location
H12076	1:40,000	August 2009	West
H12078	1:40,000	August 2009	East
H12079	1:40,000	August 2009	South
H12081	1:40,000	August 2009	Southeast

Table 3: Junction Surveys

B.2.d. Quality Control Checks

MBES quality control checks were conducted as discussed in the quality control section B of the DAPR.

B.2.e. Data Quality Factors

True Heave

Twelve lines of multibeam data failed to load true heave. All were from launch 2802 (RA-5) on DN190 and were acquired after UTC midnight. The fix true heave utility did not correct the condition and therefore the lines have only real-time heave correctors applied. All lines were examined and no significant heave artifacts are present in the data.⁵

Furuno Echosounder Interference

Multibeam data acquired by launch 2804 (RA-6) on July 9, 2009 (DN 190), near the southeastern shore of Ukolnoi Island exhibited a “trough” at nadir (Figure 2). These “troughs” clearly follow the vessels track-line and are evident in all depth ranges. This was determined to be the result of interference from the coxswain Furuno echosounder, which was inadvertently set to operate in the high frequency mode at 200 kHz. The resulting crosstalk between the Furuno echosounder and the Reson 7125 operating in high frequency at 400 kHz caused the sub-bottom return. These data were rejected, which resulted in holidays along nadir of up to 10 meters wide throughout the base surface in the effected area (Figure 2). The corresponding multibeam backscatter data was examined and no navigationally significant items were found; additionally, the least depths were accurately represented.⁶

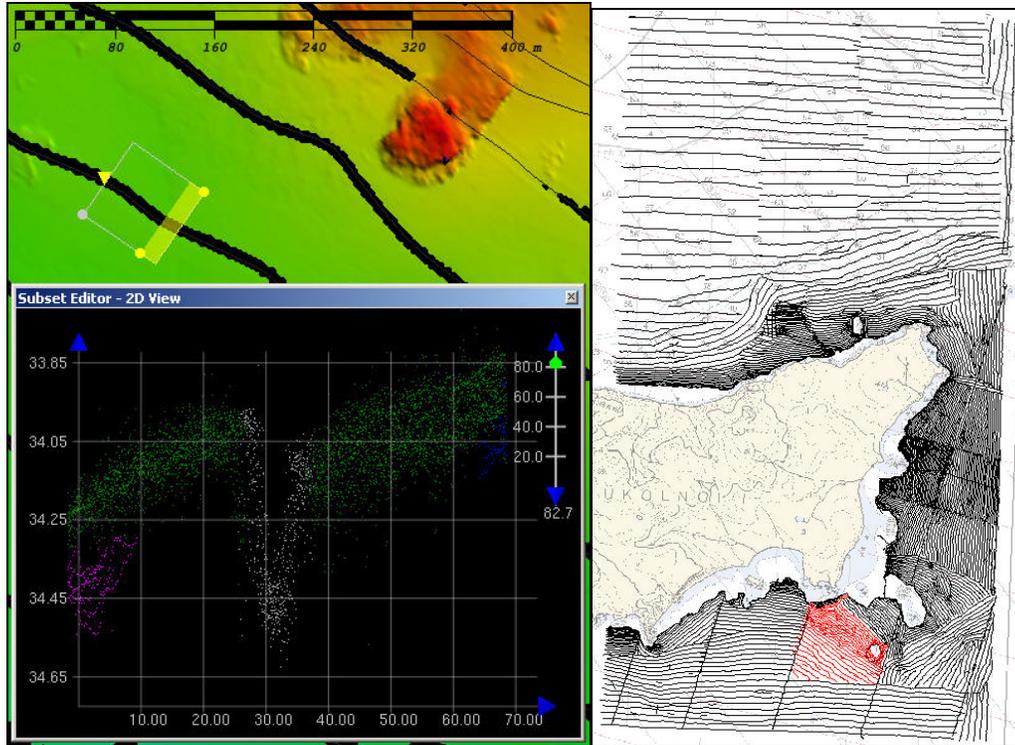


Figure 2: “The trough” exhibited in data (left). All data affected by “the trough” (right) is located near the southeastern shore of Ukolnoi Island (red)

Malfunctioning Surface Sound Velocimeter

Multibeam echosounder acquired with 1101 (RA-1) tilted Reson 8125 displayed several momentary sound velocity ‘blowouts’ where the vessel’s Digibar surface sound velocimeter was not reading the proper surface sound speed. Because this sonar uses surface sound speed input for beam forming, it was impossible to correct this data. The recurring failures were discovered during data acquisition of the project; however the intermittent Digibar sound speed error was not corrected until later in the field season through installation of a Reson SVP-71 Sound Velocimeter. To compensate, the Hydrographer, where possible, rejected soundings obviously in error from the outer beams.⁷ The corresponding multibeam backscatter data was examined and no navigationally significant items were found⁸; additionally, the least depths in the area were accurately represented. See figure 3 below.

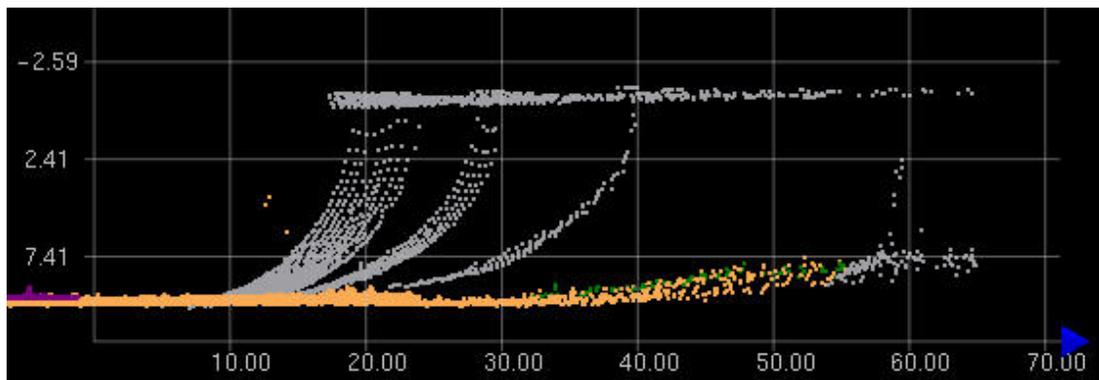


Figure 3: Sound velocity artifact (grey) resulting from a malfunctioning surface sound velocimeter viewed in CARIS HIPS subset mode.

B.2.f. Object Detection and Coverage Assessment

Data Density

Data density for survey H12077 met the 5 soundings per node density requirement with 98.88% of nodes having greater than 5 contributing soundings.⁹ The analysis was performed using ASCII files derived from H12077 final combined surfaces, one surface for each individual resolution used on the sheet. A Python script written by *Fairweather's* Weston Renoud was run on each of these ASCII files and the results tallied. The total nodes and nodes with at least five soundings were summed up for the three resolutions used for H12077 and the final percent of “passing” nodes was calculated for the whole sheet.

Kelp Preventing Coverage to the 8 meter Curve

All of the shore of eastern Ukolnoi Island was foul with kelp, which prevented the acquisition of complete multibeam coverage to the 8 meter curve. The Hydrographer recommends these areas be charted as foul with kelp.¹⁰ These kelp areas are noted in the final features file.

Holidays

Fifty-four holidays greater than 3 nodes were located in less than 30 meters of water on survey H12077 (Figure 4). Forty-eight of these holidays are minor, meeting the bare minimum definition of a holiday according to 2009 specifications and deliverables. For ease of locating, the Hydrographer marked all holiday locations with an outstanding sounding in CARIS HIPS.

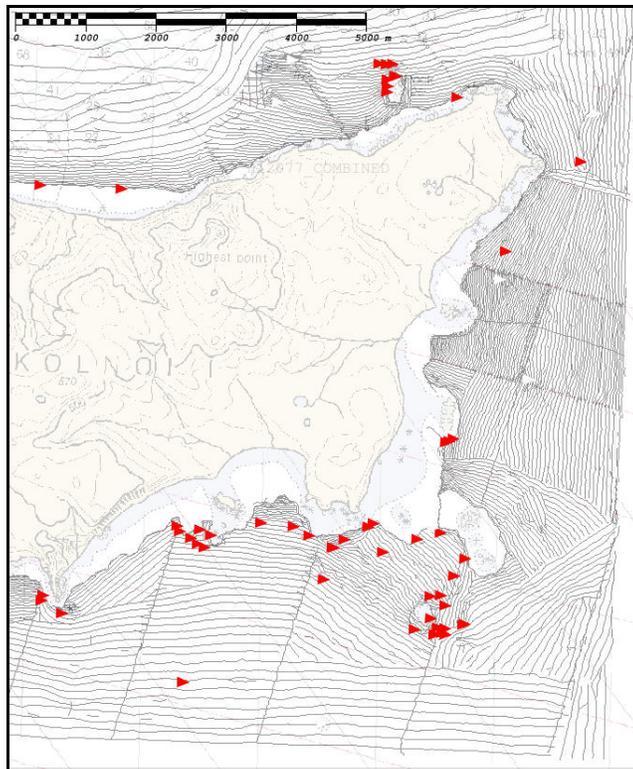


Figure 4: Locations (red) of all holidays greater than 3 nodes in less than 30 meters depth for survey H12077.

Of the 54 holidays, six holidays are over the tops of significant features. These six holidays are explained below:

The western portion of a holiday located near the northeastern shore of Ukolnoi Island ($55^{\circ}14'49.12''\text{N}$ $161^{\circ}35'59.91''\text{W}$) falls outside of the 8 meter curve and is 50 meters long and 14 meters wide. However, the eastern portion of the holiday is within the 8 meter curve and the distance between coverage is within 25 meters (Figure 5). This holiday is a result of poor line spacing during survey operations.¹¹

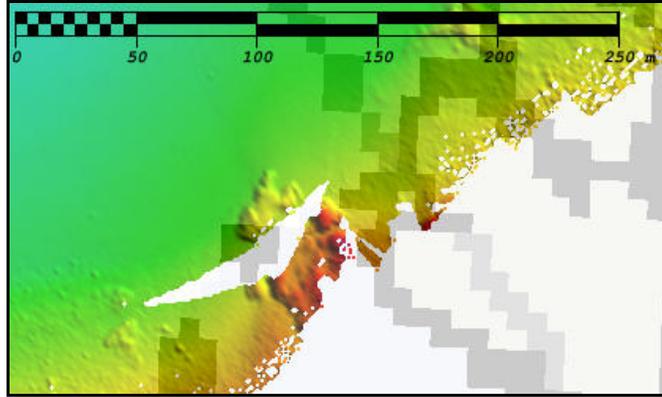


Figure 5: The western portion of this holiday falls outside of the 8 meter curve. The eastern portion, within the rocky area, is within the 8 meter curve and is within 25 meter line spacing.

There are two holidays located near a charted reef near the southeastern coast of Ukolnoi Island ($55^{\circ}12'53.0''\text{N}$ $161^{\circ}32'37.4''\text{W}$). The easternmost holiday is 57 meters long and 36 meters at its widest, in depths near 11 meters. The westernmost holiday is 27 meters by 20 meters at its widest in depths near 8 meters. All the holidays are located within an area of rocky bottom type (Figure 6)¹².

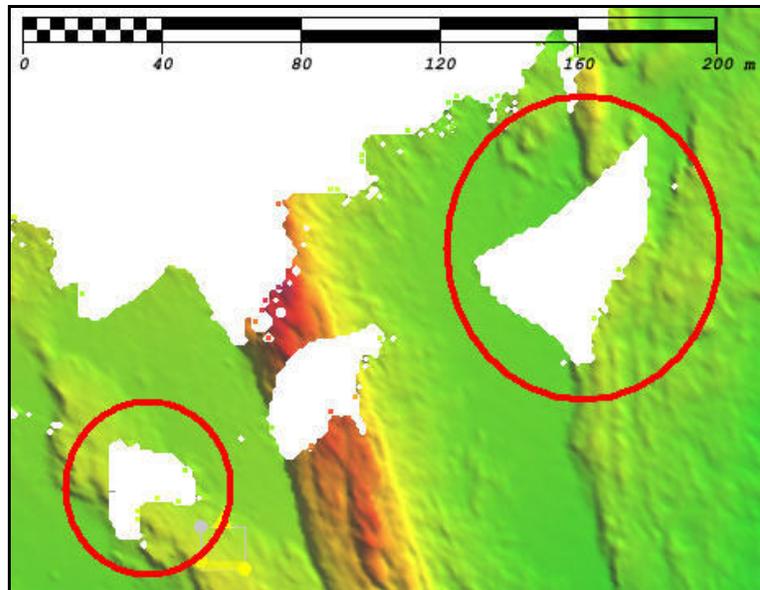


Figure 6: Two holidays (circled red) located over rocky bottom near a charted reef. The central supposed holiday encompasses an uncharted rock.

A holiday located south of the eastern shore of Ukolnoi Island ($55^{\circ}11'47.39''\text{N}$ $161^{\circ}34'10.26''\text{W}$) is six meters by five meters and fails to cover a top of a rock at 29 meters of depth (Figure 7). This holiday is a result of poor line spacing during survey acquisition. The Hydrographer recommends charting as per digital data.¹³

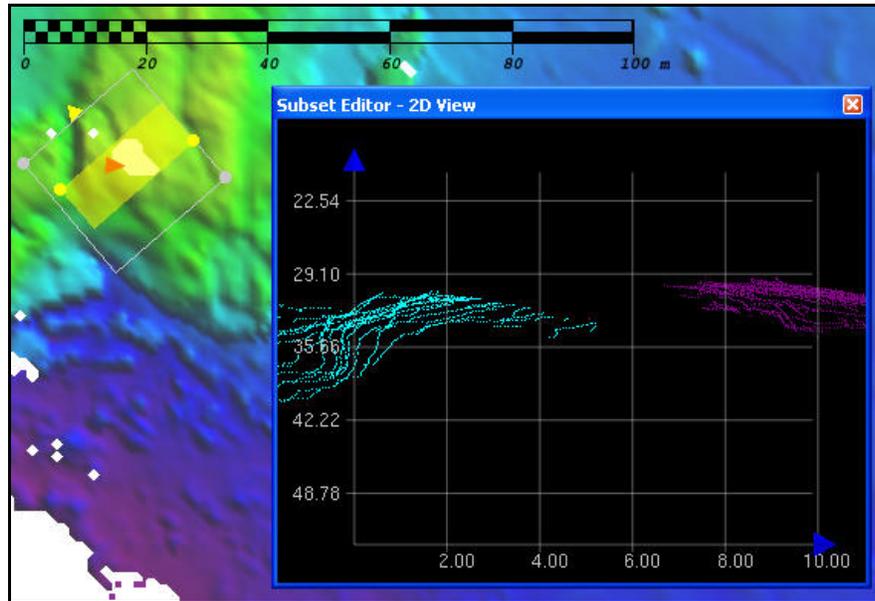


Figure 7: A holiday fails to cover a top of a rock at 29 meters depth.

A holiday located south of Ukolnoi Island ($55^{\circ}12'04.08''\text{N}$ $161^{\circ}36'05.66''\text{W}$) is three meters by three meters and fails to cover a top of a rock at 21.5 meters depth (Figure 8). This holiday is a result of poor line spacing during survey acquisition. The Hydrographer recommends charting as per digital data.¹⁴

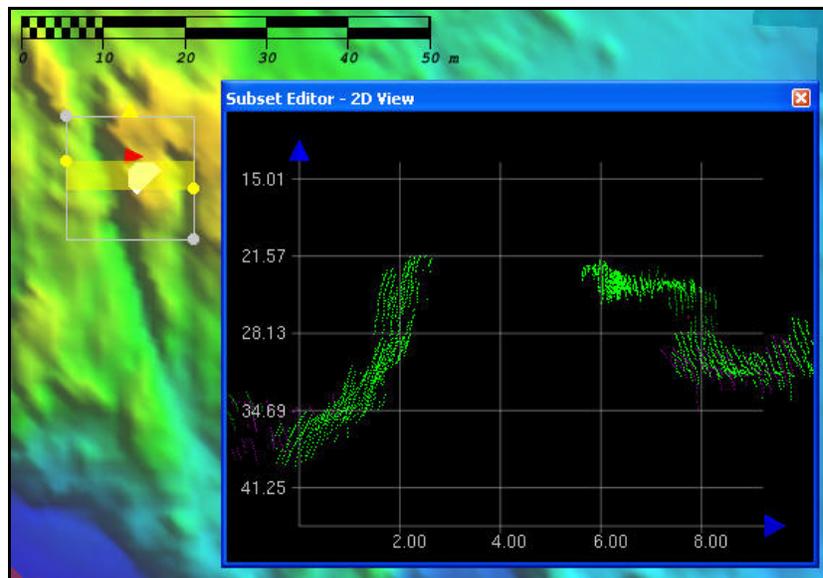


Figure 8: A holiday fails to cover a top of a rock at 21.5 meters depth.

A holiday located south of the eastern shore of Ukolnoi Island ($55^{\circ}11'27.91''\text{N}$ $161^{\circ}33'00.84''\text{W}$) is 40 meters by 15 meters in 11 meters of depth (Figure 9). The bottom surface is rocky. This holiday was a result of poor line spacing during acquisition. The Hydrographer recommends charting as per digital data.¹⁵

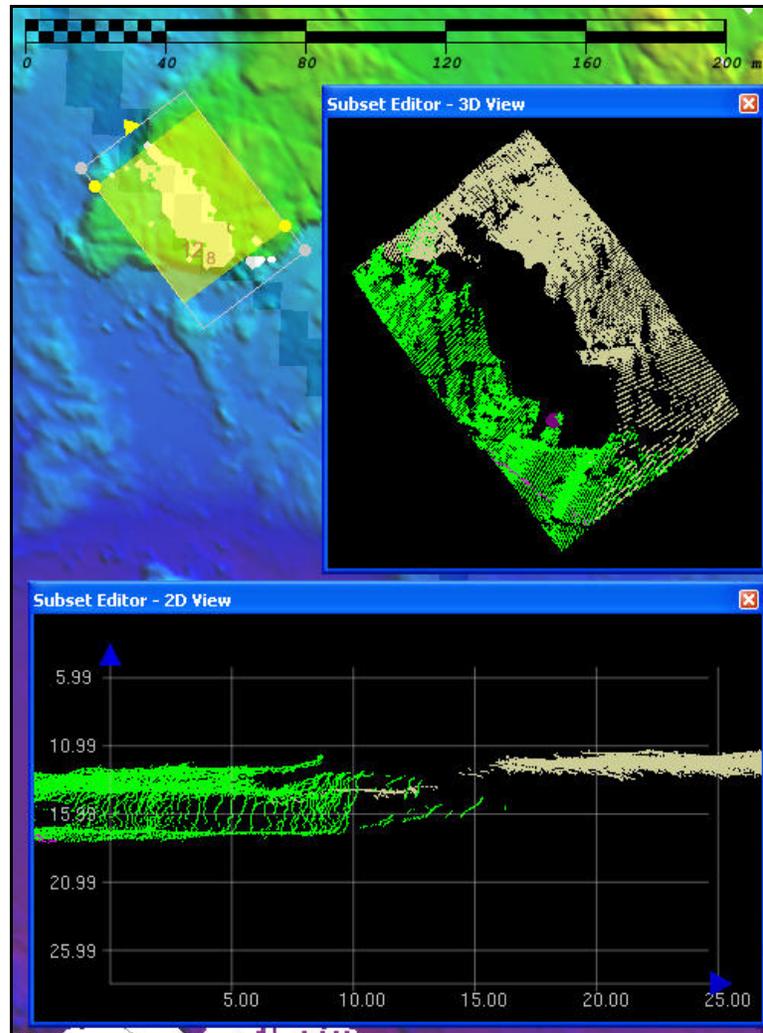


Figure 9: A holiday 40 meters by 15 meters in 11 meters of depth over a rocky surface

'Speckled' Coverage

In water deeper than 80 meters in the northern region of the sheet there are several areas where full bottom coverage was not achieved in the 4 meter resolution surface in the area of overlap between the 4 and 8 meter surfaces (Figure 10). While complete coverage was not acquired in the 4-meter surface, the 8 meter surface showed no coverage issues. The issue was brought forth to the Pacific Hydro Branch (see OPR-P184-RA-09 Density Requirements in Deep Water.pdf located in Appendix V). It was deemed that due to the flat nature of the bottom and depth of these areas, small holidays left in this area were deemed low priority and were not filled in. For holidays larger than 3 nodes across, the corresponding multibeam backscatter side scan was examined and no navigationally significant items were found; additionally, the least depths were represented.¹⁶

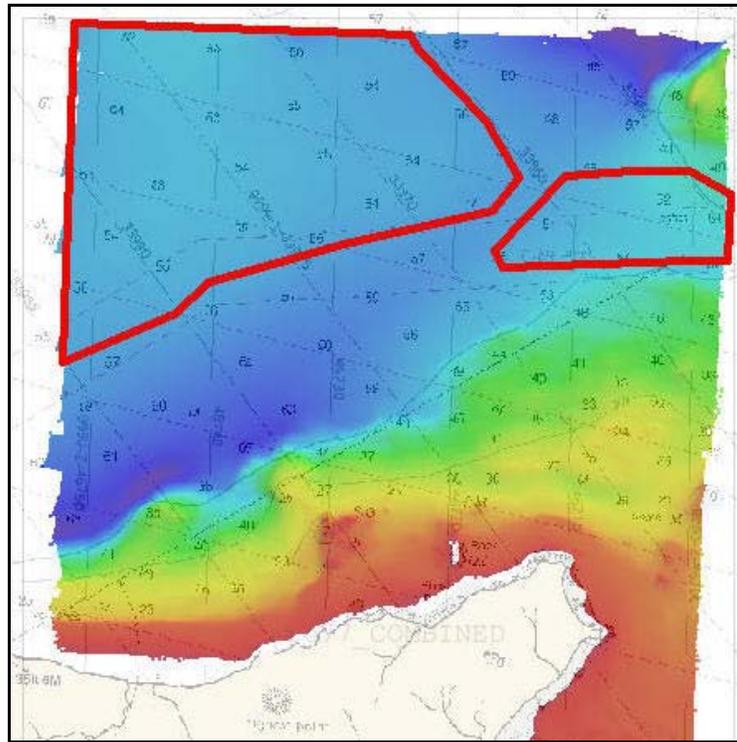


Figure 10: Areas where full bottom coverage was not achieved, outlined with red, overlaid on the finalized and combined 8 meter surface (H12077_8m_combined)

‘Speckled’ Coverage Due to Poor Survey Conditions

Data acquired on June 22, 2009 (DN173), by survey launch 2803 (RA-3), along the southern extent of survey H12077 exhibited ‘speckled coverage’ due to rough weather conditions (Figure 11). The average depth was 20 fathoms, with exceptional ‘speckles’ as shoal as 17.6 fathoms in the eastern portion of the affected data. The corresponding multibeam backscatter was examined and no navigationally significant items were found; additionally, the least depths were represented.¹⁷

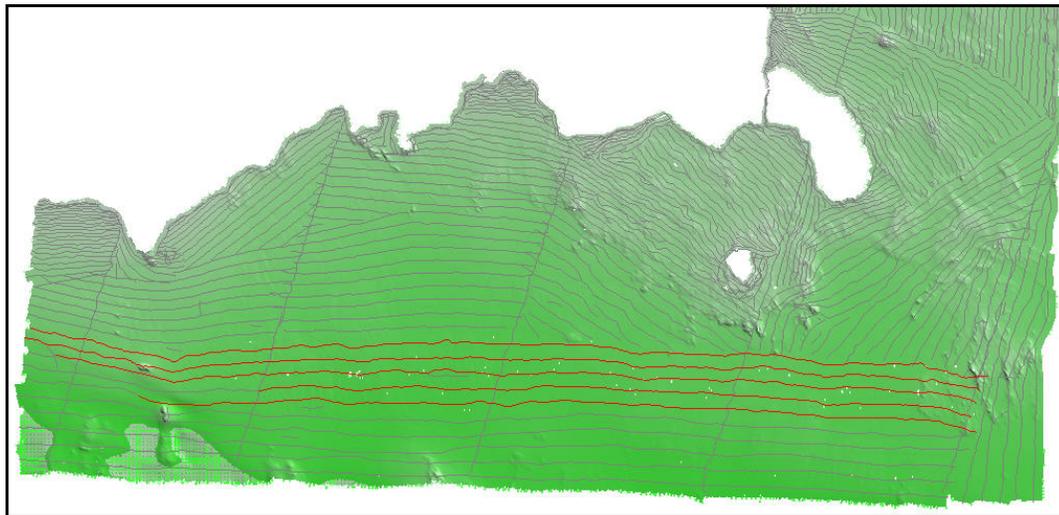


Figure 11: Areas (red) surveyed during rough conditions which yielded ‘speckled’ coverage.

B.2.g. Unusual Conditions

No unusual conditions were encountered during the survey that affected the expected accuracy and quality of survey data.

B.3. Corrections to Echo soundings

Data reduction procedures for survey H12077 conform to those detailed in the *OPR-P184-RA-09 DAPR*.

B.4. Data Processing

Data processing procedures for survey H12077 conform to those detailed in the DAPR. Data were processed using CARIS HIPS & SIPS v6.1, Service Pack 2, and Hotfix 8. Additional processing details regarding Total Propagated Uncertainty (TPU/TPE) and CUBE Surfaces and Parameters utilized, along with any deviations from the processing procedures outlined in the DAPR are discussed below.

TPU VALUES:

The survey specific parameters used to compute TPU in CARIS for H12077 are listed in Table 4.

Tide values:	Measured	0.01 m	Zoning	0.12 m
Sound Speed Values:	Measured	0.50 m/s	Surface	As per DAPR

Table 4: Survey Specific CARIS TPU Parameters

Many BASE surfaces were used in processing H12077. Final BASE surface resolutions and depth ranges were set according to Table 5 below, with field sheets smaller than 25 million nodes. CUBE surfaces were processed with a parameter set corresponding to each resolution as per HTD 2009-2. The CUBE parameter XML file is included with the data deliverables. The submission Field Sheet and BASE Surface structure are shown in figures 12, 13, and 14.

Depth Range (m)	Resolution (m)
0-23	1
20-52	2
46-115	4
103-350	8

Table 5: Depth range and surface resolutions for H12077

In addition, the higher resolution 0.5-meter BASE surfaces listed below were added in areas of particularly rough seafloor in waters 17 meters and shoaler. This ensured that all features were accurately portrayed in the bathymetric model in accordance to 2009 specifications and deliverables. This practice reduced the number of designated soundings required.

Soundings and contours were generated in CARIS HIPS from the final combined BASE surface for field unit review purposes. They are included for reference only and are not intended as a deliverable.

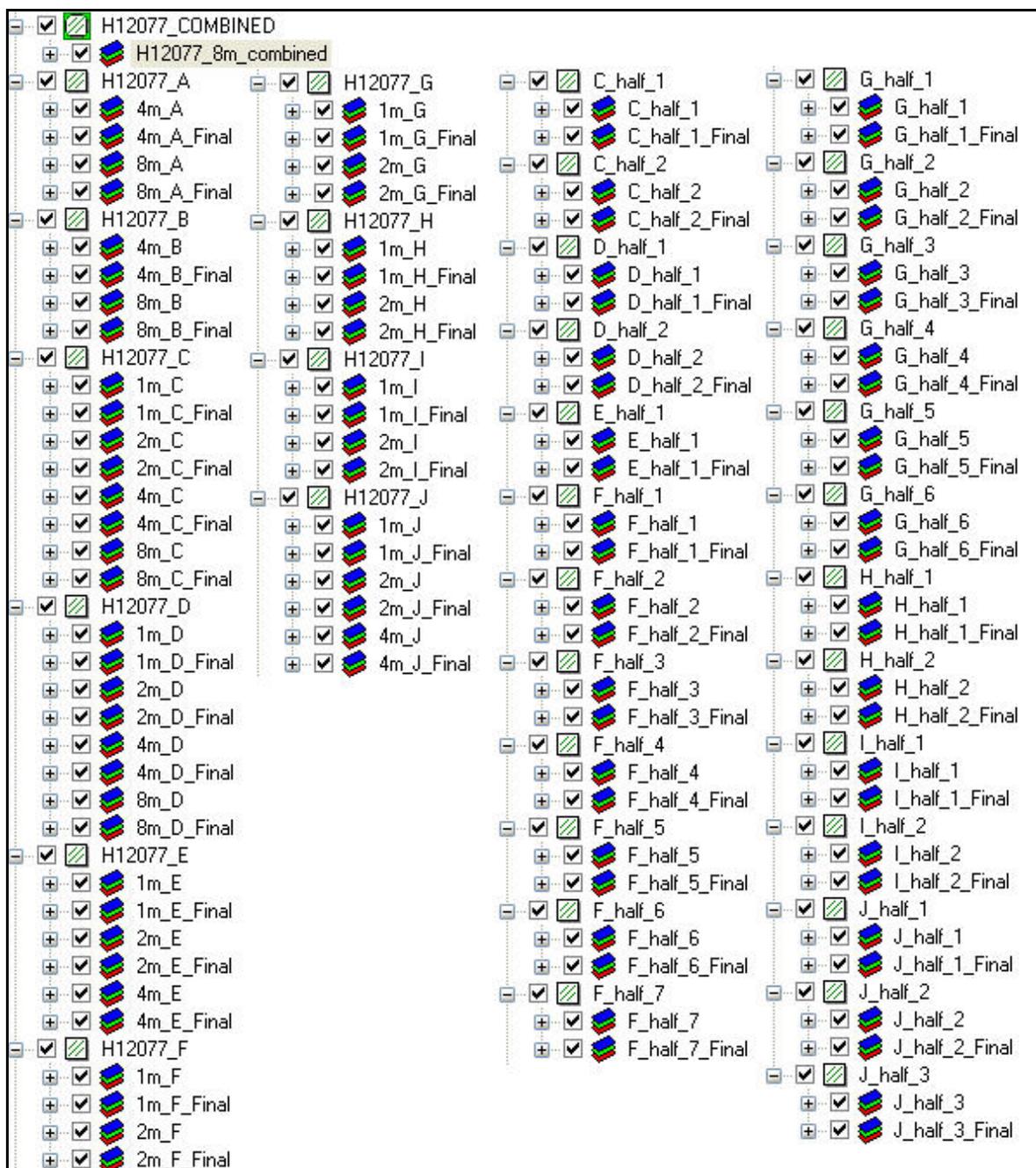


Figure 12: Field sheets and BASE surfaces submitted with H12077

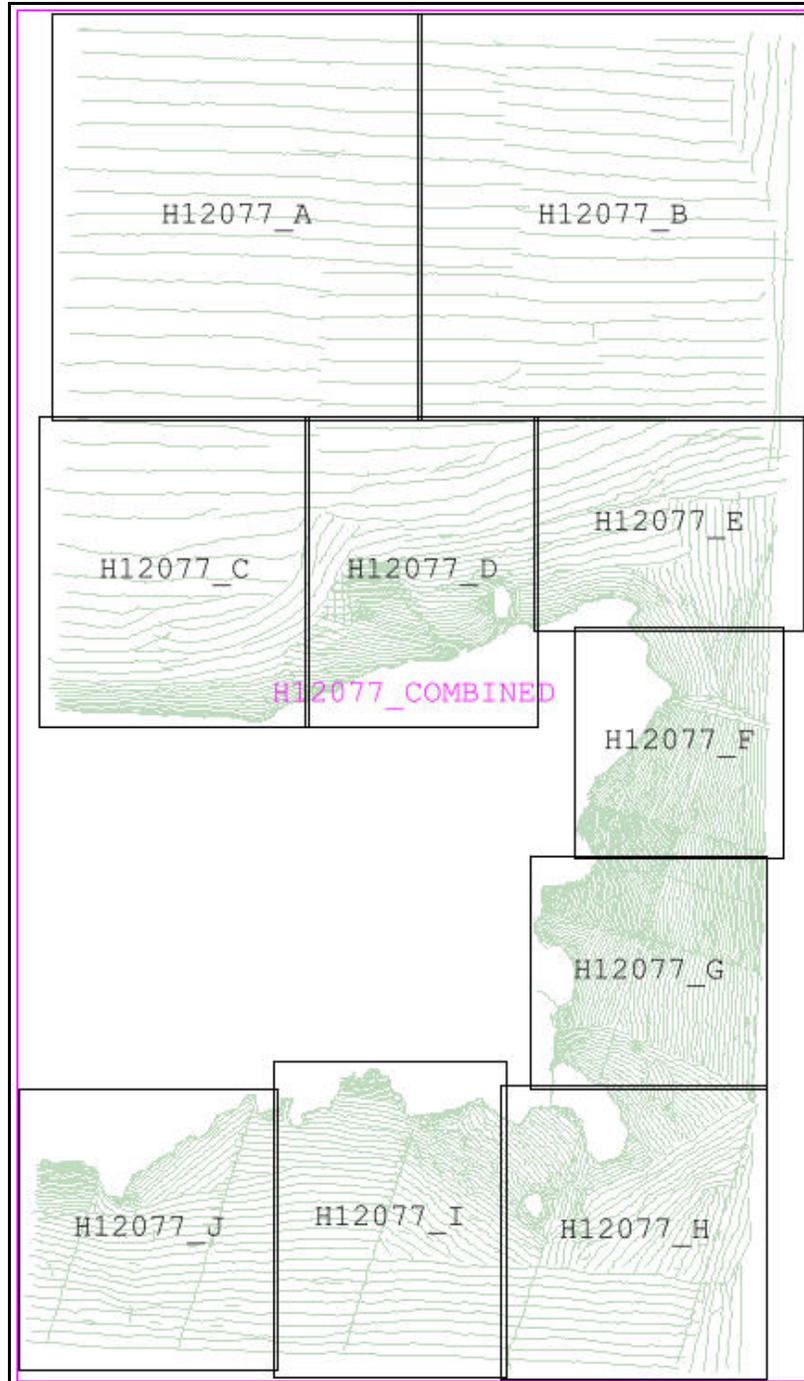


Figure 13: H12077 field sheet layout without half meter

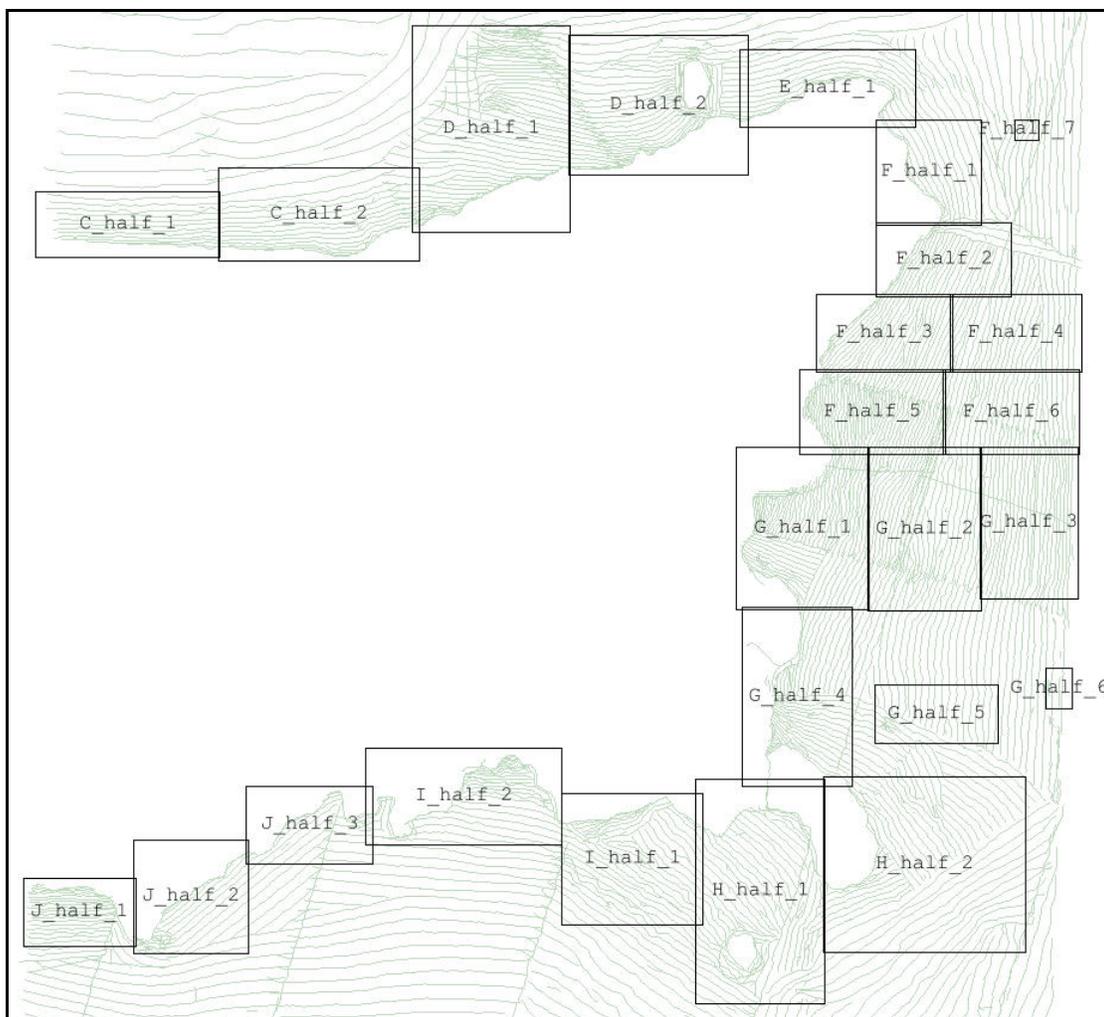


Figure 14: H12077 half meter resolution field sheet layout

C. VERTICAL AND HORIZONTAL CONTROL

Project OPR-P184-RA-09 did not require static GPS observations or other horizontal control work, and all tide corrections were generated from CO-OPS maintained tide stations. Thus, no Horizontal and Vertical Control Report will be submitted.

C.1. Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential GPS (DGPS) was the sole method of positioning. The differential corrector beacons utilized for this survey are given in Table 6.

Location	Frequency	Operator	Priority
Cold Bay	289 kHz	USCG	Primary

Table 6: Differential Corrector Sources for H12077

C.2. Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary tide station at Sand Point, AK (945-9450) served as control for datum determination and as the primary source for water level reducers for survey H12077.

No tertiary gauges were required.

As per the Project Instructions, all data were reduced to MLLW using the final approved water levels from the Sand Point, AK station (954-9450) by applying tide file 9459450.tid and time and height correctors through the zone corrector file P184RA2009CORP.zdf. **It will not be necessary for the Pacific Hydrographic Branch to reapply the final approved water levels to the survey data during final processing.**

The request for Final Approved Water Levels for H12077 was submitted to CO-OPS on August 7, 2009 in accordance with the Field Procedures Manual (FPM), dated April 2009. The Final Tide Note was received on September 11, 2009.¹⁸ This documentation is included in Appendix IV.

D. RESULTS AND RECOMMENDATIONS

D.1. Chart Comparison

D.1.a. Survey Agreement with Chart

Chart comparison procedures were followed as outlined in section 4.5 of the FPM and section 8.1.3-D.1 of the HSSDM, utilizing CARIS HIPS software program.

Survey H12077 was compared with the following charts:

Chart	Scale	Edition and Date	Local Notice to Mariners Applied Through
16549	1:80,000	15 th Ed, July 2003	10/24/2009
16551	1:80,000	10 th Ed; Apr 2008	10/24/2009

Table 7: Charts compared with H12077

The majority of area of survey H12077 was previously unsurveyed and devoid of charted depths, except for the northern survey area. Despite the age of the data contributing to chart 16549 and 16551, most charted depths are within a half fathom of survey soundings, with only four exceptions being within 2 fathoms in water depths exceeding 50 fathoms (Figure 15).

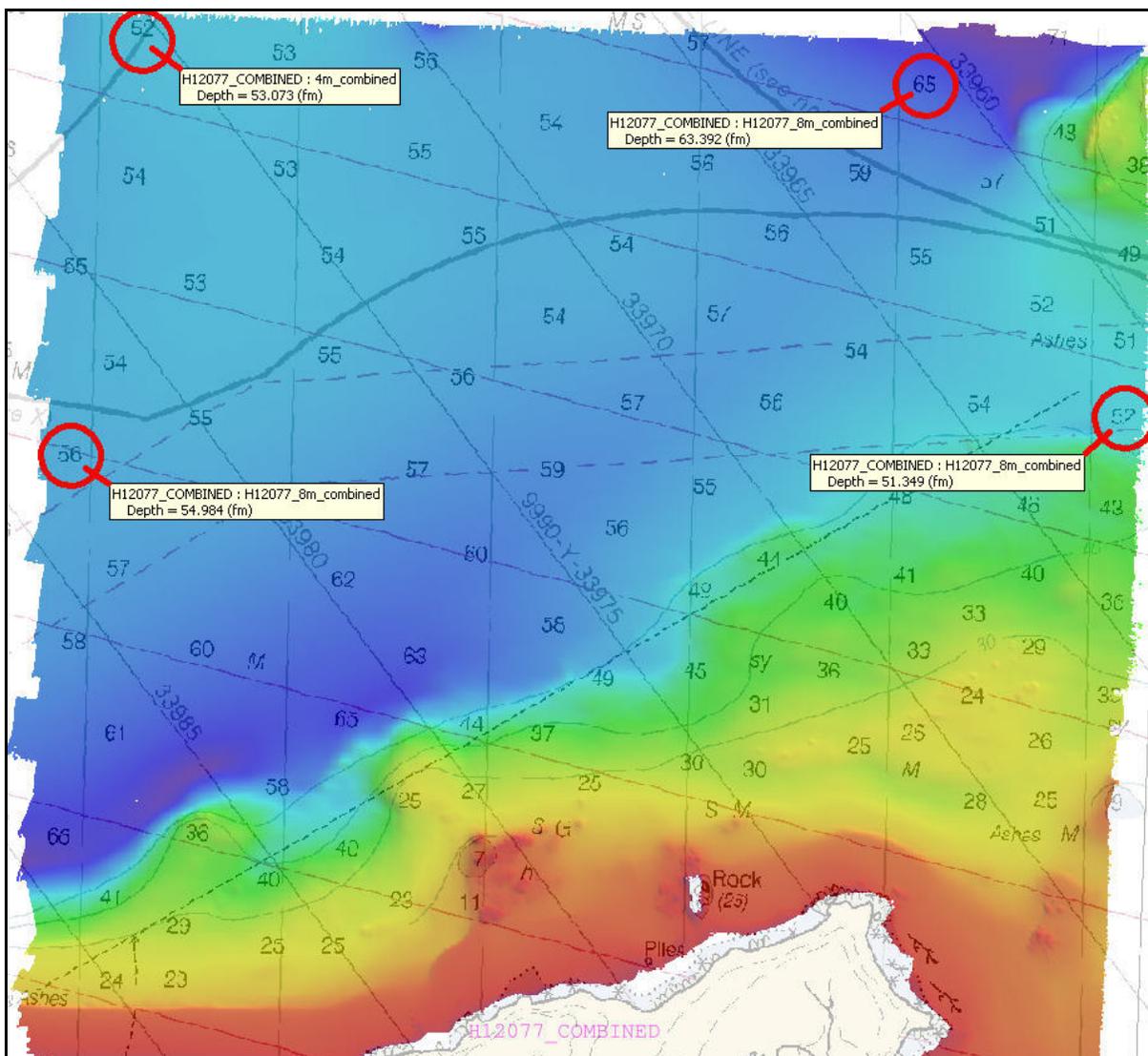


Figure 15: 16549 chart comparison of survey soundings with charted depths from field sheet H12077_8m_combined of survey H12077. Red circles indicate where there is more than a half fathom difference between survey soundings and charted depths

In many instances, this survey found shoaler soundings between charted soundings even though agreement at the position of the charted depths was good. This can be attributed to increased bottom coverage using MBES versus lead line survey methods. A feature in the northeast corner of survey H12077 (55°19'08.02"N 161°30'31.65"W) has a least depth of approximately 25.4 fathoms, 13 fathoms shoaler than nearby charted depths (Figure 16).¹⁹

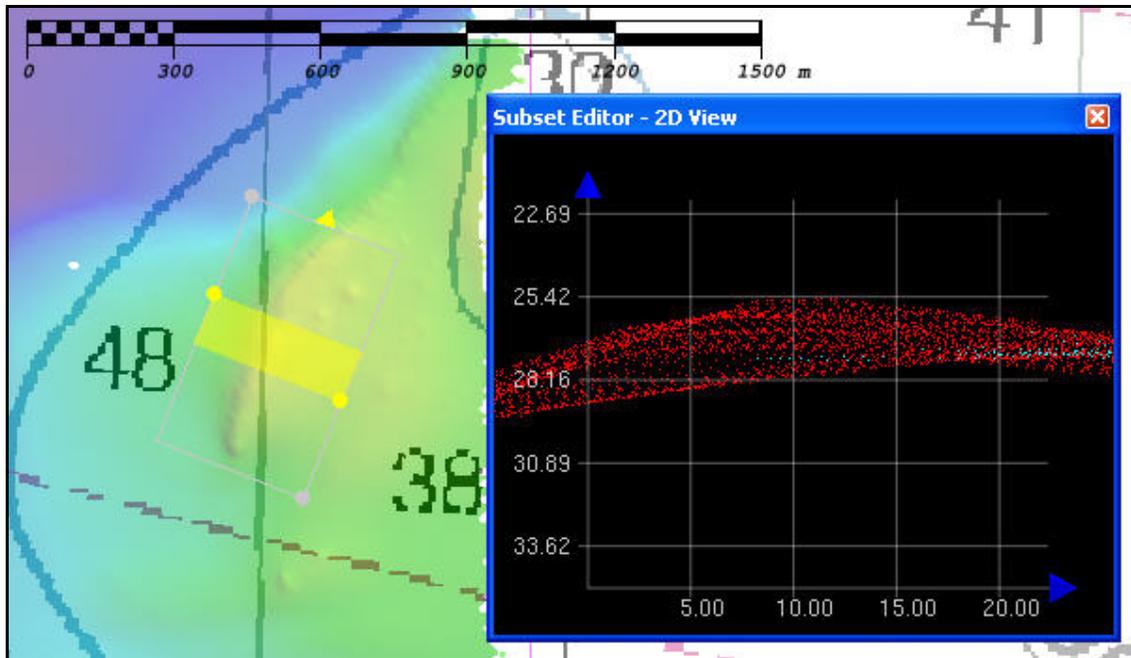


Figure 16: A feature's least depth is nearly 8 fathoms shoaler than nearby charted depths (units in 2D View are in fathoms).

A rock awash charted at location 55°10'40.09"N 161°34'09.72"W, was disproven by complete multibeam coverage (Figure 17). An 'anti-DTON' was submitted with the DTON report submitted on February 23, 2010 (Appendix 1).²⁰ Survey H12079 located a 2-fathom shoal 0.7 nautical miles southwest of this charted location and submitted it as a DTON on February 2, 2010.²¹

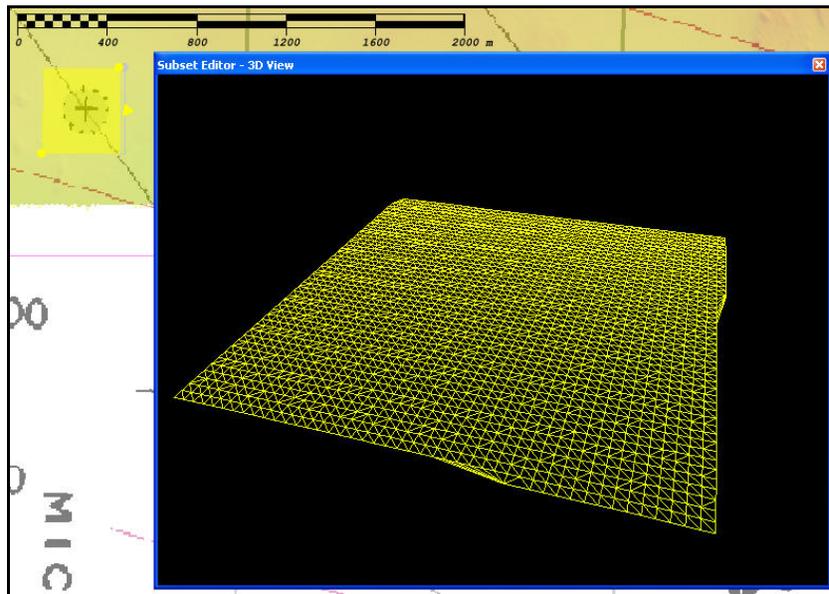


Figure 17: A charted awash rock is disproven by multibeam bathymetry as depicted by the lack of a feature in this 8 meter CUBE wireframe reference surface.

A rock charted at the southernmost tip of Ukolnoi Island was not seen in main scheme bathymetry, located near the southernmost tip of Ukolnoi Island (55°11'27.99"N 161°37'35.58"W). However, 150 meters to the west of the charted rock is a 2.8 fathom shoal (Figure 18).²²

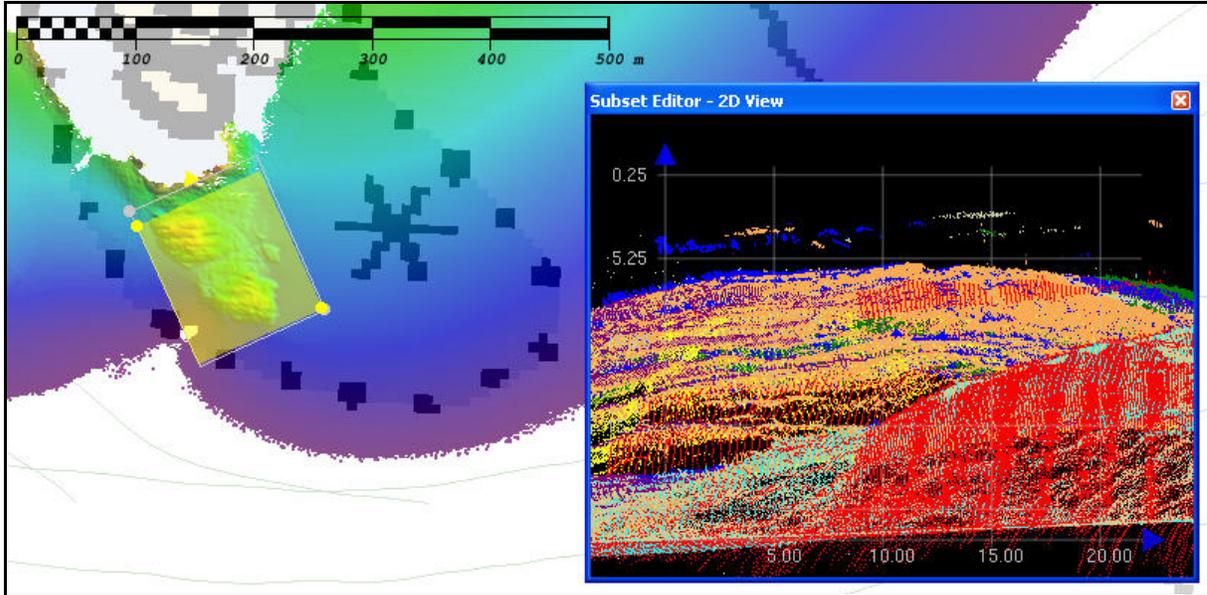


Figure 18: A charted rock is disproved by mainscheme bathymetry. A shoal feature is located 150 meters west of the charted rock.

Charted piles located at 55°15'14.4"N 161°33'53.01"W were not observed during shoreline verification. Additionally, no indication of the charted piles was observed in main scheme bathymetry or backscatter imagery. Hydrographer recommends removing the charted pile symbol.²³

Discrepancies between the charted shoreline of 16549 and 16551 were noted as indicated in figures 19, 20, 21 and 22. The shoreline depicted on chart 16551 agrees reasonably well with the composite source shoreline as provided with the project; however a significant offset is apparent between composite source and the shoreline of chart 16549. A more detailed high water line and additional rocks and ledges are also found on chart 16551 when compared to chart 16549. Even though both charts are of the same scale, the shoreline of chart 16551 appears to have been compiled at a higher resolution than that of chart 16549. The charted 16551 shoreline agrees much more closely with shoreline observed in the field in the near shore areas of east Ukolnoi Island than that of chart 16549.²⁴

The dotted obstruction line on chart 16549 is depicted incorrectly. The placement of the obstruction line buffering the near shore rocks surrounding Ukolnoi Island is correct, except as modified in the field, but the area between obstruction line and mean high water (MHW) is tinted green, instead of blue. The contrast between charts 16549 and 16551 is shown below in figures 19, 20, 21 and 22. The Hydrographer recommends adjusting the tint inshore of the charted danger lines on chart 16549 to blue.²⁵

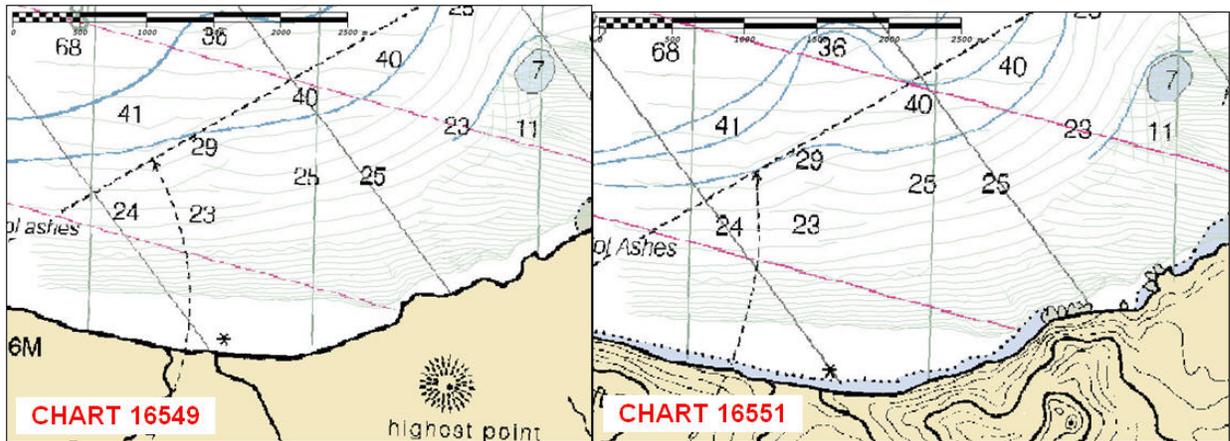


Figure 19: The north shore of chart 16551 contains additional charted features: ledges and an extended dotted obstruction line.

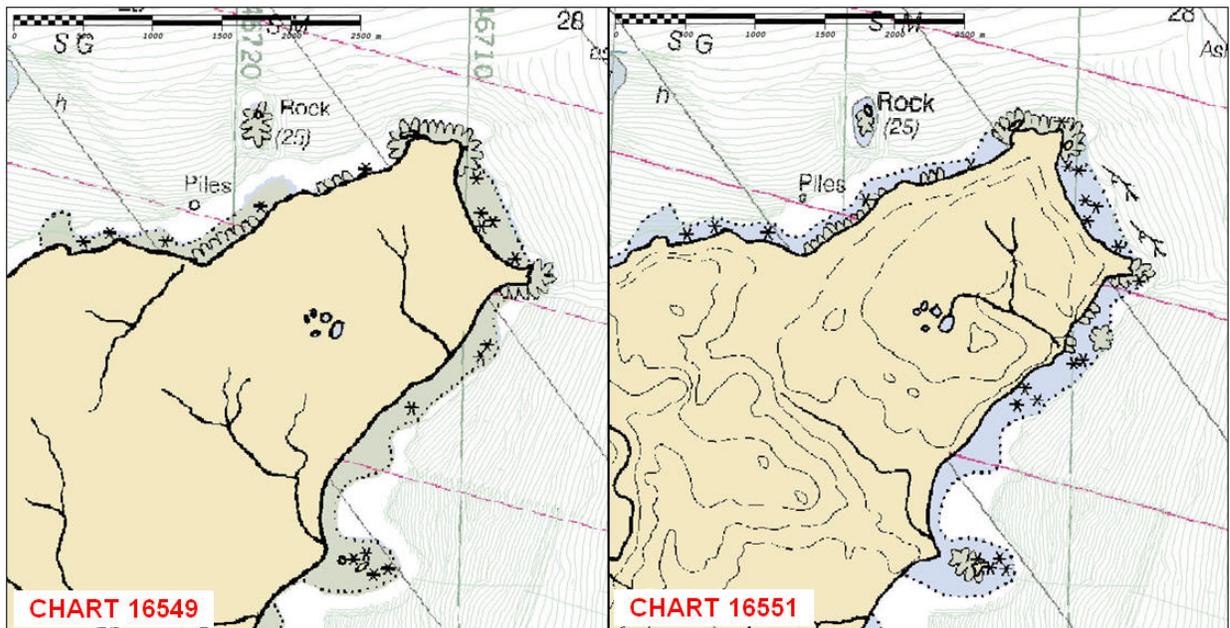


Figure 20: The northeast shore of chart 16551 contains additional charted features: ledges, reefs, rocks, and an altered dotted obstruction line.

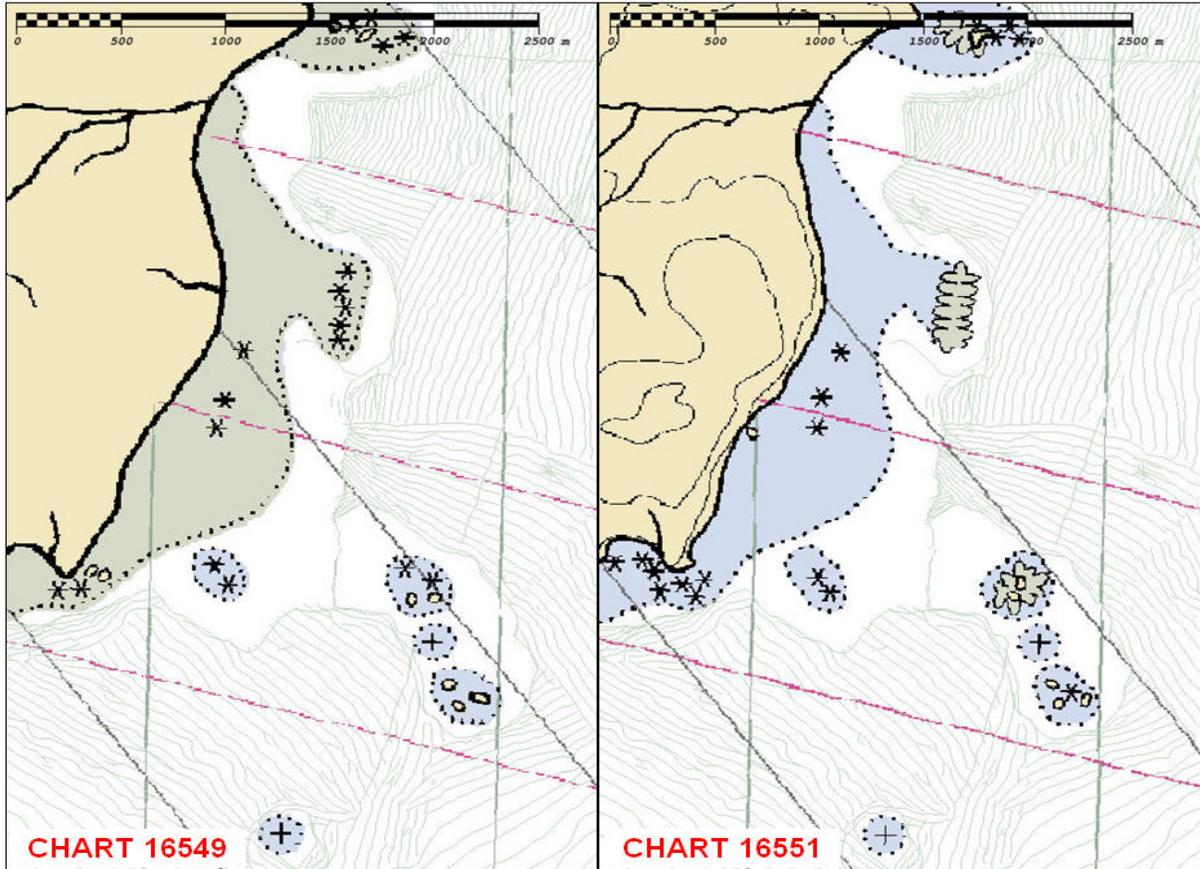


Figure 21: The eastern shore of chart 16551 contains additional charted features: reefs and additional rocks.

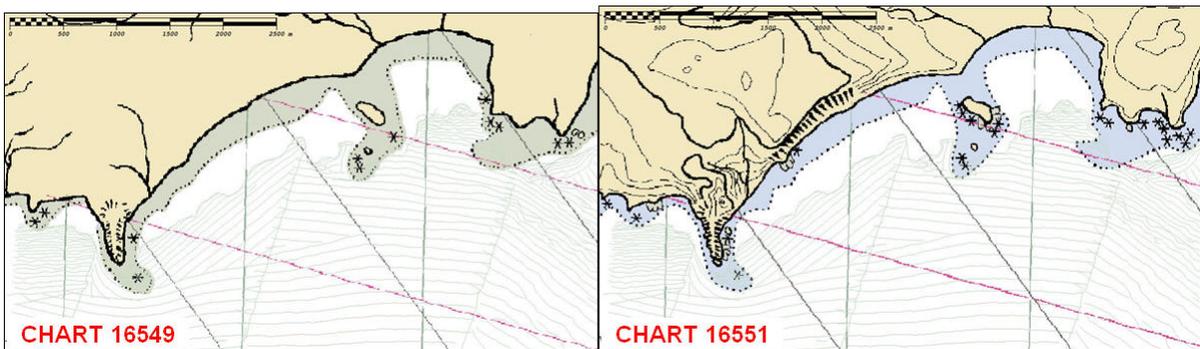


Figure 22: The southern shore of chart 16551 contains additional charted features: a ledge, an islet, and additional rocks.

The Hydrographer recommends that survey soundings supersede all prior survey and charted depths in the common area.²⁶

D.1.b. Automated Wreck and Obstruction Information System (AWOIS) Items

One (1) AWOIS item is located within the survey limits of H12077. This item was assigned for full investigation.²⁷ Descriptions of each AWOIS item investigation are included in the Survey Feature Report in Appendix II.²⁸

AWOIS#	Latitude	Longitude	remark	recommendation
53797	55°14'56.02"	161°29'56.99"	AWOIS item was noted as an exposed ledge in the charted position during shoreline verification.	Charted ledge be used as a valid maritime boundary claim.

Table 8: Assigned AWOIS Items and the Hydrographer’s remarks and recommendations

D.1.c. Other Investigated Features

No additional charted items were investigated and no other features were located on survey H12077.

D.1.d. Dangers to Navigation

Eight (8) Dangers to Navigation (DTONs) and one (1) anti-DTON were found on survey H12077 and reported to the Marine Charting Division via email on February 23, 2010.²⁹ The original DTON submission package is included in Appendix I. Descriptions of each DTON are included in the Survey Feature Report in Appendix II.³⁰

D.2. Additional Results

D.2.a. Shoreline Verification

Shoreline Source

Limited shoreline verification was accomplished using the composite source file (CSF) provided with the project instructions. The CSF has been created using the latest ENC’s, most recent aerial photogrammetry, and prior hydrographic surveys. Prior survey features within the CSF are for reference. This composite source was printed on paper “boat sheets” and displayed in CARIS Notebook and/or Hypack for field verification.

Shoreline Verification

Limited shoreline verification was conducted near predicted low water in accordance with the Specifications and Deliverables section 8.2 and the Field Procedures Manual section 3.5 and 4.4. Detached positions (DPs) acquired during shoreline verification were recorded and S-57 attributed in CARIS Notebook. These indicate revisions to features and features not found in the provided CSF. In addition, annotations describing shoreline were recorded on the hard copy plots of the CSF as described above.

All shoreline data is submitted in CARIS Notebook HOB files. The session H12077_Notebook contains the following:

HOB File	Purpose and Contents
H12077_Composite_Source.hob	Original Source Data as provided for project OPR-P184-RA-09 and filtered to the limits of survey H12077.
H12077_Reference.hob	Survey outline and limit lines, and AWOIS item positions and radii.
H12077_Final_Features.hob	Composite source data modified by the field to best represent the shoreline at survey scale. This includes the addition of new features and modification of source features. This file retains all features neither verified nor disproved by this survey.
H12077_Disprovals.hob	Composite source items that were deleted or modified in position or geographic type.

Table 9: List and Description of Notebook HOB files

Source Shoreline Changes and New Features

Significant kelp growth was present on Ukolnoi Island that prevented near-shore acquisition. A buffer was established outside the area foul with kelp. This buffer is depicted in the H12077_Final_Features.hob file. The Hydrographer recommends charting these foul kelp areas as defined in the H12077_Final_Features.hob file.³¹

Recommendations

The Hydrographer recommends that the shoreline as depicted in the Notebook HOB files supersede and complement shoreline information compiled on the composite source file and charts as described above.³²

D.2.b. Prior Survey Comparison

Prior survey comparison was not performed.

D.2.c. Aids to Navigation

No Aids to Navigation were located within the survey limits of H12077.³³

D.2.d. Overhead Features

There are no overhead features within the limits of survey H12077.³⁴

D.2.e. Submarine Cables and Pipelines

There is one (1) charted cable area within the survey limits of H12077, as shown in Figure 23. No visible indication of cables was evident in the MBES data in the charted cable area. The Hydrographer recommends retaining the cable areas as charted.³⁵

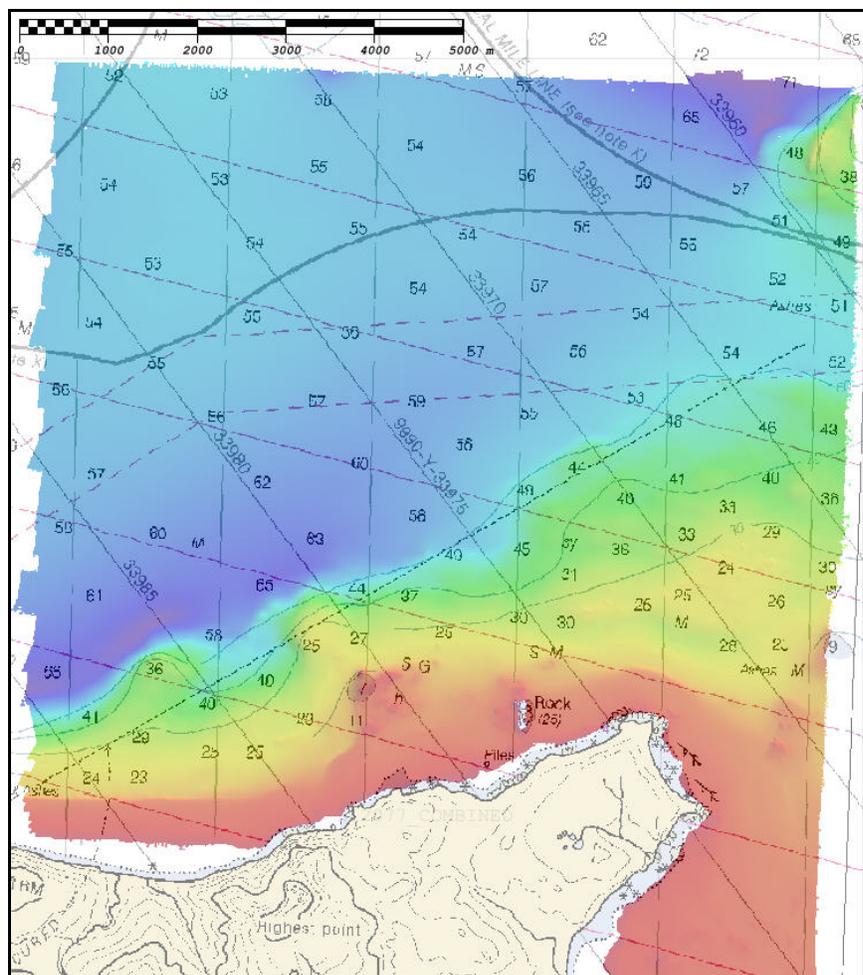


Figure 23: Cable Area running east to west, north of Ukolnoi Island.

D.2.f. Ferry Routes

There are no ferry routes charted within the limits of survey H12077, and none were observed to be operating in the area.³⁶

D.2.g. Bottom Samples

Thirteen (13) bottom samples were collected on survey H12077.³⁷ Of the thirteen bottom samples, two were taken over charted, historic bottom samples.

The first bottom sample comparison is charted as mud, located 55°14'53.32"N 161°37'01.38"W. The bottom sample collected was green, sticky mud, matching the charted bottom type.³⁸

The second bottom sample comparison is charted as ashes, located 55°14'53.32"N 161°37'01.38"W. The bottom sample collected was green, sticky mud, not matching the charted bottom type.³⁹

All bottom samples have been included in the H12077_Final_Features.hob file in the CARIS Notebook session.

D.2.h. Other Findings

There are no other findings to report for survey H12077.

E. APPROVAL

As Chief of Party, field operations for hydrographic survey H12077 were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports. The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual (April 2009 edition), Field Procedures Manual (April 2009 edition), Standing and Project Instructions, and all HSD Technical Directives issued through July 2009. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required. All data and reports are respectfully submitted to N/CS34, Pacific Hydrographic Branch.

Listed below are supplemental reports submitted separately that contain additional information relevant to this survey:

Title	Date Sent	Office
Hydrographic Systems Readiness Review Package	<i>Under separate cover</i>	N/CS34
Data Acquisition and Processing Report for OPR-P184-RA-09	January 12, 2010	N/CS34
Coast Pilot Report for OPR- P184-RA-09	<i>To be submitted</i>	N/CS26
Tides and Water Levels Package for OPR-O184-RA-09	July 31, 2009	N/OPS1

Approved and Forwarded:  Donald W. Haines, CAPT/NOAA
I am approving this document
2010.03.17 16:15:27 -07'00'

Captain Donald W. Haines, NOAA
Commanding Officer, NOAA Ship *Rainier*

In addition, the following individuals were also responsible for overseeing data acquisition and processing of this survey:

Survey Sheet Manager:  Ian Colvert
I am the author of this document
2010.03.17 21:03:06 Z

Chief Survey Technician:  James B. Jacobson
I have reviewed this document
2010.03.17 20:55:01 Z

James B. Jacobson
Chief Survey Technician, NOAA Ship *Rainier*

Field Operations Officer:  Brent J. Pounds
I have reviewed this document
2010.03.17 15:32:29 -07'00'

Lieutenant Brent J. Pounds, NOAA
Field Operations Officer, NOAA Ship *Rainier*

Revisions and Corrections Compiled During Office Processing and Certification

- ¹ Concur with clarification. Although the crossline to mainscheme percentage didn't meet the 5% requirement as stated in the Hydrographic Survey Specifications and Deliverables, the crosslines run during the survey were sufficient for quality control purposes.
- ² Concur.
- ³ A common junction was made with H12076 and H12079 which have already been compiled. A junction with H12078 and H12081 will be made when those surveys are compiled.
- ⁴ Concur.
- ⁵ Concur. The data is adequate to supersede charted data in the common area.
- ⁶ Concur. After rejecting the bad data due to crosstalk with the Furuno, the remaining data is adequate to supersede charted data in the common area.
- ⁷ After rejecting the outer beams on data exhibiting sound speed errors, the remaining data is adequate to supersede charted data in the common area.
- ⁸ Concur.
- ⁹ Concur. The data is adequate to supersede charted data in the common area.
- ¹⁰ Concur with clarification. Chart foul areas as depicted in the HCell.
- ¹¹ The holiday was examined and no navigationally significant features were discovered based on the data surrounding the holiday. Due to the proximity to a charted ledge that is retained in the HCell and a new foul area delineated during the survey that is included in the HCell, the area is deemed adequately addressed despite the holiday.
- ¹² The holiday was examined and no navigationally significant features were discovered based on the data surrounding the holiday. Due to the proximity to a new foul area delineated during the survey that is included in the HCell, the area is deemed adequately addressed despite the holiday.
- ¹³ Concur with clarification. Chart depths and submerged rocks as depicted in the HCell.
- ¹⁴ Concur with clarification. The holiday is located within a new foul area. Chart new foul area, depth unknown, as depicted in the HCell.
- ¹⁵ Concur with clarification. Chart depths and rocks as depicted in the HCell.
- ¹⁶ Concur. Chart depths as depicted in the HCell.
- ¹⁷ Concur. Chart depths as depicted in the HCell.
- ¹⁸ See attached Tide Note dated September 4, 2009.
- ¹⁹ Concur. Chart depths as depicted in the HCell.
- ²⁰ The rock awash has been removed from the charts. Chart depths as depicted in the HCell.
- ²¹ The DTON has been applied to the charts and is included in HCell H12079.
- ²² The area is included within a foul area delineated during the survey. Chart as depicted in the HCell.
- ²³ Concur. The pile symbol and note have been blue noted to be removed.
- ²⁴ Update depths and features as depicted in the HCell. Update charted coastline based on the latest available GC shoreline.
- ²⁵ Concur with clarification. Recommend that chart 16549 be updated based the appearance of 16551 and update foul areas as depicted in the HCell. Update charted coastline based on the latest available GC shoreline.
- ²⁶ Concur.
- ²⁷ The AWOIS item was a maritime boundary verification. The item is included in the HCell with the AWOIS number included in the NINFOM field.
- ²⁸ See attached feature report.
- ²⁹ All eight DTONs have been applied to the charts and all but one are included in the HCell. The ¾fm rock located at 55-12-12.6N, 161-32-45.6W is a submerged rock located inside a new foul area. The rock has been blue noted to be removed so that there are no charted depths inside the foul area. The anti-DTON has been removed from the charts and does not require further action.
- ³⁰ See DTON section in attached feature report.
- ³¹ Chart foul areas as depicted in the HCell.

³² Concur with clarification. The submitted hob files were used in the compilation of HCell H12077. During compilation, some modifications were made to accommodate chart scale. Chart features as depicted in the HCell.

³³ Concur.

³⁴ Concur.

³⁵ Concur. The cable area has been blue noted to be retained.

³⁶ Concur.

³⁷ Twelve bottom samples collected during H12077 are included in the HCell. One bottom sample is not included because it falls within the limits of survey H12078 and will be included in that HCell.

³⁸ Concur. The new bottom sample is included in the HCell and the charted one has been blue noted to be removed.

³⁹ Concur. The new bottom sample is included in the HCell and the charted one has been blue noted to be removed.

H12077 Feature Report

Registry Number: H12077
State: Alaska
Locality: Pavlov Islands
Sub-locality: East of Ukolnoi Island
Project Number: OPR-P184-RA-09
Survey Dates: 06/22/2009 - 08/04/2009

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16551	10th	04/01/2008	1:80,000 (16551_1)	[L]NTM: ?
16549	15th	07/01/2003	1:80,000 (16549_1)	USCG LNM: 02/24/2009 (04/07/2009) CHS NTM: None (03/27/2009) NGA NTM: 01/21/2006 (04/11/2009)
16540	12th	01/01/2005	1:300,000 (16540_1)	[L]NTM: ?
16011	37th	11/01/2007	1:1,023,188 (16011_1)	[L]NTM: ?
16006	35th	04/01/2008	1:1,534,076 (16006_1)	[L]NTM: ?
513	7th	06/01/2004	1:3,500,000 (513_1)	[L]NTM: ?
500	8th	06/01/2003	1:3,500,000 (500_1)	[L]NTM: ?
530	32nd	06/01/2007	1:4,860,700 (530_1)	[L]NTM: ?
50	6th	06/01/2003	1:10,000,000 (50_1)	[L]NTM: ?

* Correction(s) - source: last correction applied (last correction reviewed--"cleared date")

Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	AWOIS	[no data]	[no data]	[no data]	---
2.1	Rock	7.72 m	55° 15' 27.0" N	161° 30' 47.1" W	---
2.2	Rock	7.62 m	55° 14' 08.6" N	161° 31' 59.2" W	---
2.3	Rock	7.55 m	55° 15' 46.6" N	161° 34' 52.9" W	---
2.4	Rock	6.46 m	55° 15' 26.9" N	161° 35' 03.3" W	---
2.5	Rock	1.31 m	55° 12' 12.6" N	161° 32' 45.6" W	---
2.6	Rock	14.25 m	55° 11' 04.0" N	161° 30' 37.0" W	---

2.7	Rock	3.94 m	55° 12' 36.5" N	161° 31' 44.2" W	---
2.8	Rock	5.34 m	55° 13' 22.7" N	161° 31' 32.6" W	---
2.9	Shoal	46.81 m	55° 10' 40.4" N	161° 34' 09.0" W	---

1 - AWOIS Features

1.1) AWOIS #53797 - MARITIME BOUNDARY CLAIM

No Primary Survey Feature for this AWOIS Item

Search Position: 55° 14' 50.6" N, 161° 35' 56.9" W
Historical Depth: [None]
Search Radius: 75
Search Technique: [None]
Technique Notes: Verify location and height of charted ledge in support of Maritime Boundary claim.

History Notes:

Source not available.

Survey Summary

Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

AWOIS item 53797 was noted as an exposed ledge in the charted position during shoreline verification.

Feature Correlation

Address	Feature	Range	Azimuth	Status
OPR-P184-RA-09 AWOIS	AWOIS # 53797	0.00	000.0	Primary

Hydrographer Recommendations

Hydrographer recommends that the charted ledge be used as a valid maritime boundary claim.

S-57 Data

[None]

2 - Dangers to Navigation

2.1) Profile/Beam - 366/426 from h12077 / 2801_reson7125_hf_512 / 2009-216 / 000_2147

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 15' 27.0" N, 161° 30' 47.1" W
Least Depth: 7.72 m (= 25.34 ft = 4.223 fm = 4 fm 1.34 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) ± 1.962 m ; TVU (TPEv) ± 0.267 m
Timestamp: 2009-216.21:48:13.598 (08/04/2009)
Survey Line: h12077 / 2801_reson7125_hf_512 / 2009-216 / 000_2147
Profile/Beam: 366/426
Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

Uncharted 7.72 meter sounding.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12077/2801_reson7125_hf_512/2009-216/000_2147	366/426	0.00	000.0	Primary

Hydrographer Recommendations

DTON, Danger To Navigation.

Cartographically-Rounded Depth (Affected Charts):

4 ¼fm (16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 530_1)

7.7m (500_1, 513_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20090804
 SORIND - US, US, nsurf, H12077
 VALSOU - 7.723 m
 WATLEV - 3:always under water/submerged

Feature Images

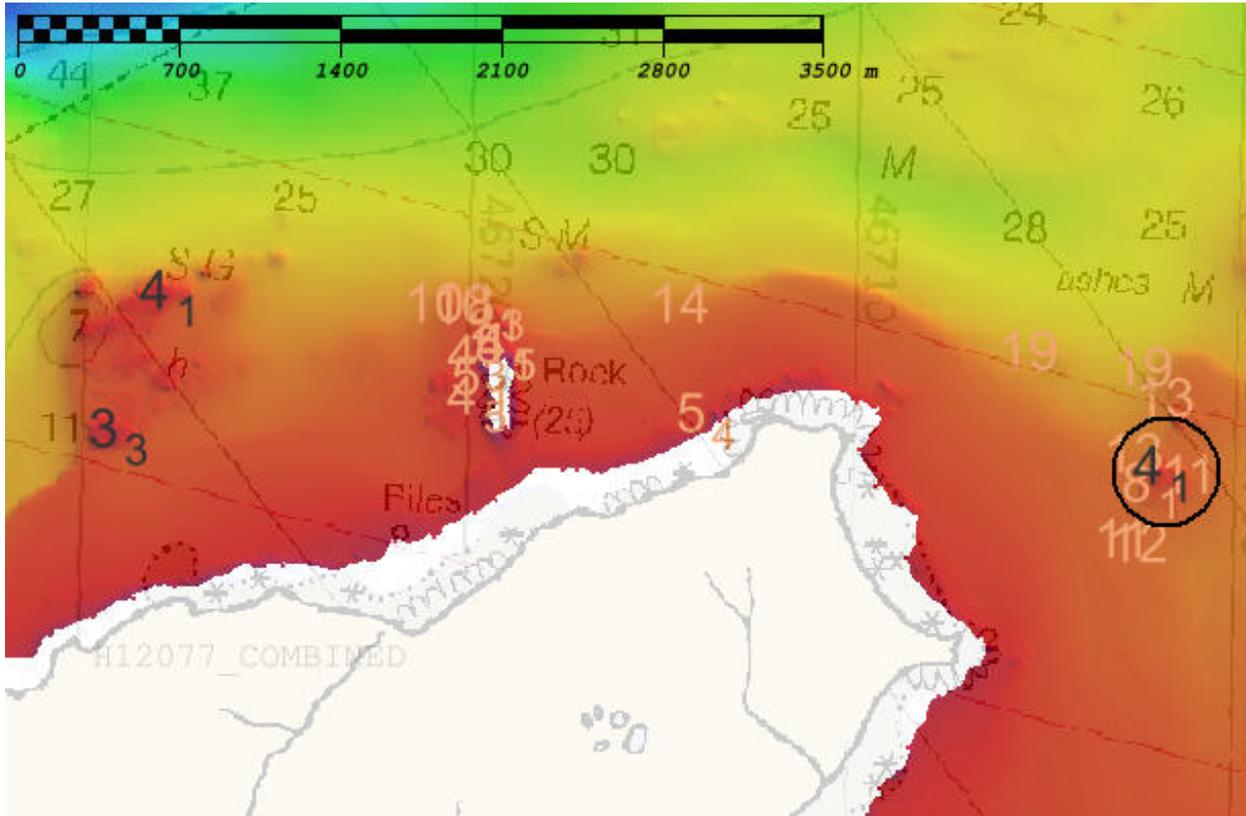


Figure 2.1.1

2.2) Profile/Beam - 633/122 from h12077 / 2802_reson7125_hf_512 / 2009-216 / 000_1946

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 14' 08.6" N, 161° 31' 59.2" W
Least Depth: 7.62 m (= 25.00 ft = 4.166 fm = 4 fm 1.00 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) ± 1.962 m ; TVU (TPEv) ± 0.266 m
Timestamp: 2009-216.19:47:37.974 (08/04/2009)
Survey Line: h12077 / 2802_reson7125_hf_512 / 2009-216 / 000_1946
Profile/Beam: 633/122
Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

Uncharted 7.62 meter sounding.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12077/2802_reson7125_hf_512/2009-216/000_1946	633/122	0.00	000.0	Primary

Hydrographer Recommendations

DTON, Danger To Navigation.

Cartographically-Rounded Depth (Affected Charts):

4fm (16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 530_1)

7.6m (500_1, 513_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20090804
 SORIND - US, US, nsurf, H12077
 VALSOU - 7.619 m
 WATLEV - 3:always under water/submerged

Feature Images

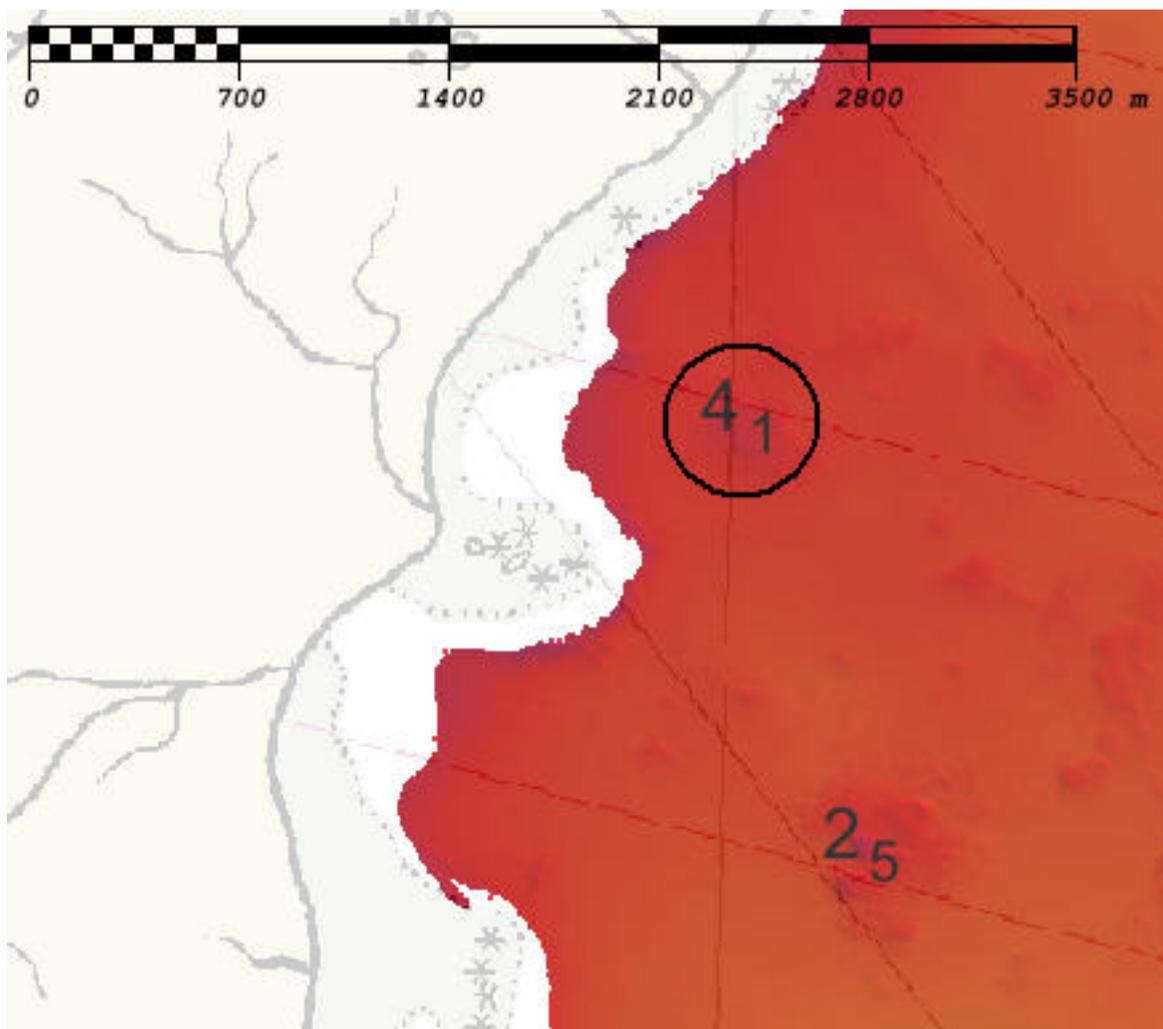


Figure 2.2.1

2.3) Profile/Beam - 628/1 from h12077 / 2803_reson7125_hf_512 / 2009-198 / 000_1724

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 15' 46.6" N, 161° 34' 52.9" W
Least Depth: 7.55 m (= 24.76 ft = 4.127 fm = 4 fm 0.76 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) ± 1.965 m ; TVU (TPEv) ± 0.273 m
Timestamp: 2009-198.17:25:41.784 (07/17/2009)
Survey Line: h12077 / 2803_reson7125_hf_512 / 2009-198 / 000_1724
Profile/Beam: 628/1
Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

Uncharted 7.55 meters sounding.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12077/2803_reson7125_hf_512/2009-198/000_1724	628/1	0.00	000.0	Primary

Hydrographer Recommendations

DTON, Danger To Navigation.

Cartographically-Rounded Depth (Affected Charts):

4fm (16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 530_1)

7.5m (500_1, 513_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20090804
 SORIND - US, US, nsurf, H12077
 VALSOU - 7.547 m
 WATLEV - 3:always under water/submerged

Feature Images

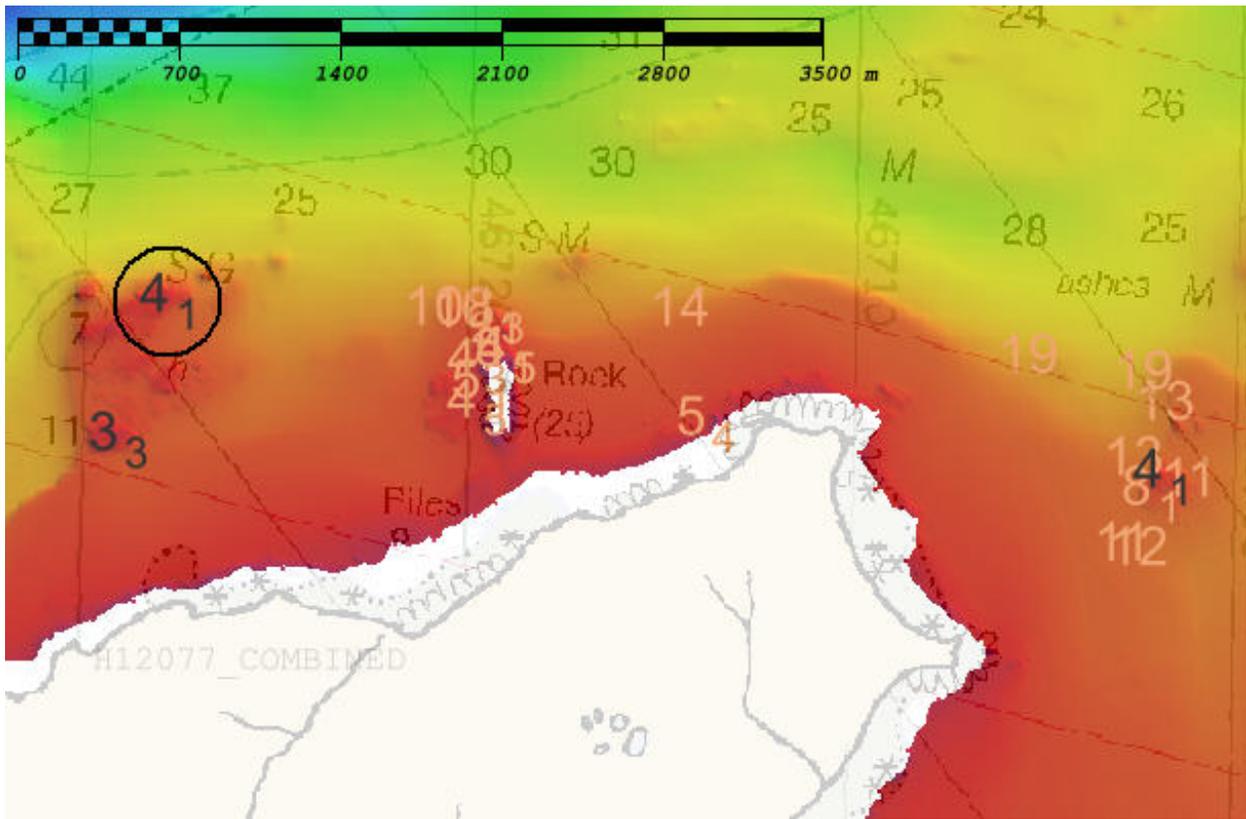


Figure 2.3.1

2.4) Profile/Beam - 517/65 from h12077 / 2803_reson7125_hf_512 / 2009-198 / 000_1930

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 15' 26.9" N, 161° 35' 03.3" W
Least Depth: 6.46 m (= 21.21 ft = 3.535 fm = 3 fm 3.21 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) ± 1.963 m ; TVU (TPEv) ± 0.268 m
Timestamp: 2009-198.19:31:07.355 (07/17/2009)
Survey Line: h12077 / 2803_reson7125_hf_512 / 2009-198 / 000_1930
Profile/Beam: 517/65
Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

Uncharted 6.46 meter sounding.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12077/2803_reson7125_hf_512/2009-198/000_1930	517/65	0.00	000.0	Primary

Hydrographer Recommendations

Chart as DTON, Danger To Navigation.

Cartographically-Rounded Depth (Affected Charts):

3 ½fm (16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 530_1)

6.5m (500_1, 513_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20090804
 SORIND - US, US, nsurf, H12077
 VALSOU - 6.464 m
 WATLEV - 3:always under water/submerged

Feature Images

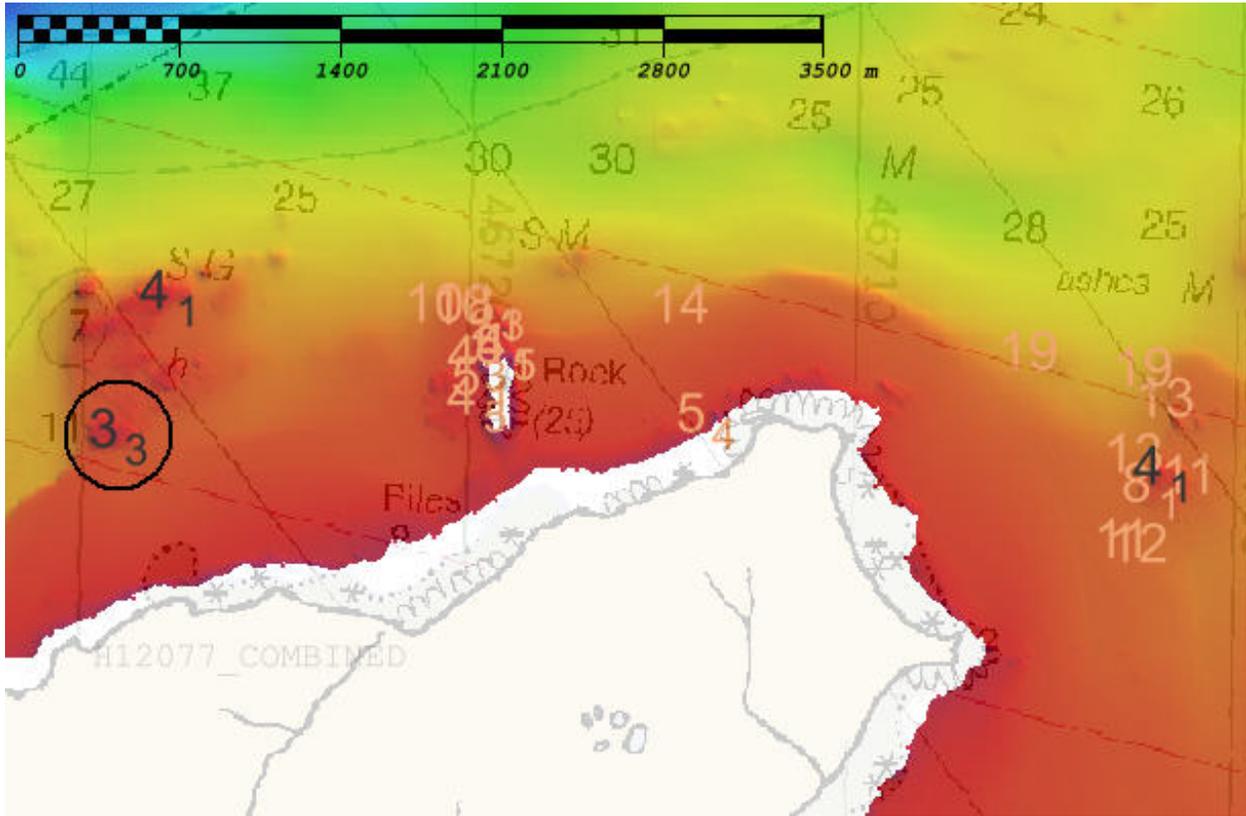


Figure 2.4.1

2.5) Profile/Beam - 769/136 from h12077 / 2804_reson7125_hf_512 / 2009-191 / 000_0027

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 12' 12.6" N, 161° 32' 45.6" W
Least Depth: 1.31 m (= 4.29 ft = 0.715 fm = 0 fm 4.29 ft)
TPU (±1.96σ): **THU (TPEh)** ±1.960 m ; **TVU (TPEv)** ±0.264 m
Timestamp: 2009-192.00:28:10.255 (07/11/2009)
Survey Line: h12077 / 2804_reson7125_hf_512 / 2009-191 / 000_0027
Profile/Beam: 769/136
Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

Uncharted 1.31 meter sounding.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12077/2804_reson7125_hf_512/2009-191/000_0027	769/136	0.00	000.0	Primary

Hydrographer Recommendations

DTON, Danger to Navigation.

Cartographically-Rounded Depth (Affected Charts):

0 ¾fm (16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 530_1)
 1.3m (500_1, 513_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20090804
 SORIND - US, US, nsurf, H12077
 VALSOU - 1.308 m
 WATLEV - 3:always under water/submerged

Feature Images

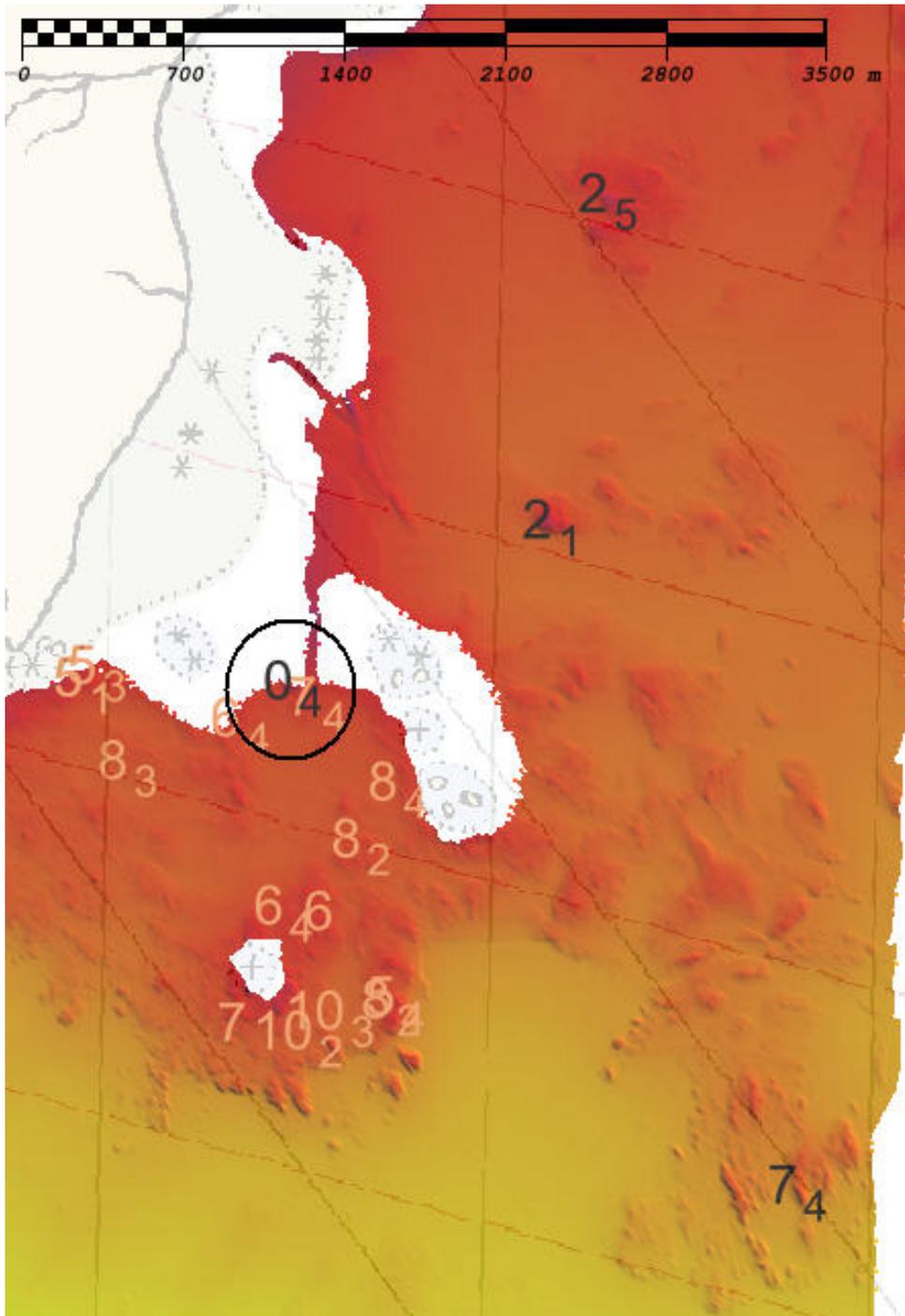


Figure 2.5.1

2.6) Profile/Beam - 121/79 from h12077 / 2804_reson7125_hf_512 / 2009-191 / 000_1818

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 11' 04.0" N, 161° 30' 37.0" W
Least Depth: 14.25 m (= 46.74 ft = 7.790 fm = 7 fm 4.74 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** ± 1.968 m ; **TVU (TPEv)** ± 0.277 m
Timestamp: 2009-191.18:19:05.513 (07/10/2009)
Survey Line: h12077 / 2804_reson7125_hf_512 / 2009-191 / 000_1818
Profile/Beam: 121/79
Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

Uncharted 14.25 meter sounding.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12077/2804_reson7125_hf_512/2009-191/000_1818	121/79	0.00	000.0	Primary

Hydrographer Recommendations

DTON, Danger to Navigation.

Cartographically-Rounded Depth (Affected Charts):

7 $\frac{3}{4}$ fm (16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 530_1)

14.2m (500_1, 513_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20080804
 SORIND - US, US, nsurf, H12077
 VALSOU - 14.247 m
 WATLEV - 3:always under water/submerged

Feature Images

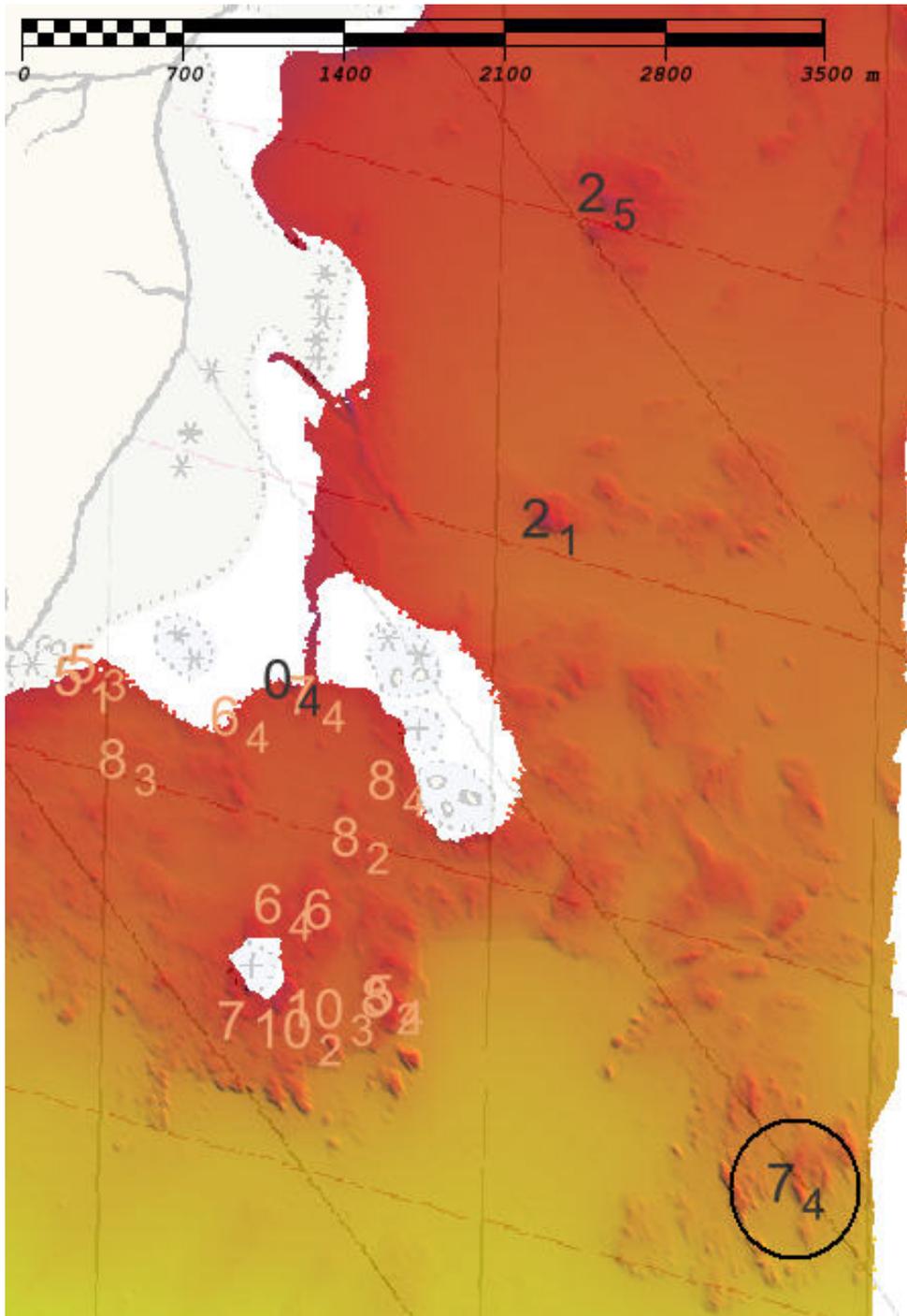


Figure 2.6.1

2.7) Profile/Beam - 321/335 from h12077 / 2804_reson7125_hf_512 / 2009-192 / 000_2151

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 12' 36.5" N, 161° 31' 44.2" W
Least Depth: 3.94 m (= 12.92 ft = 2.153 fm = 2 fm 0.92 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) ± 1.960 m ; TVU (TPEv) ± 0.264 m
Timestamp: 2009-192.21:51:48.481 (07/11/2009)
Survey Line: h12077 / 2804_reson7125_hf_512 / 2009-192 / 000_2151
Profile/Beam: 321/335
Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

Uncharted 3.94 meter sounding.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12077/2804_reson7125_hf_512/2009-192/000_2151	321/335	0.00	000.0	Primary

Hydrographer Recommendations

DTON. Danger to Navigation.

Cartographically-Rounded Depth (Affected Charts):

2fm (16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 530_1)

3.9m (500_1, 513_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20090804
 SORIND - US, US, nsurf, H12077
 VALSOU - 3.937 m
 WATLEV - 3:always under water/submerged

Feature Images

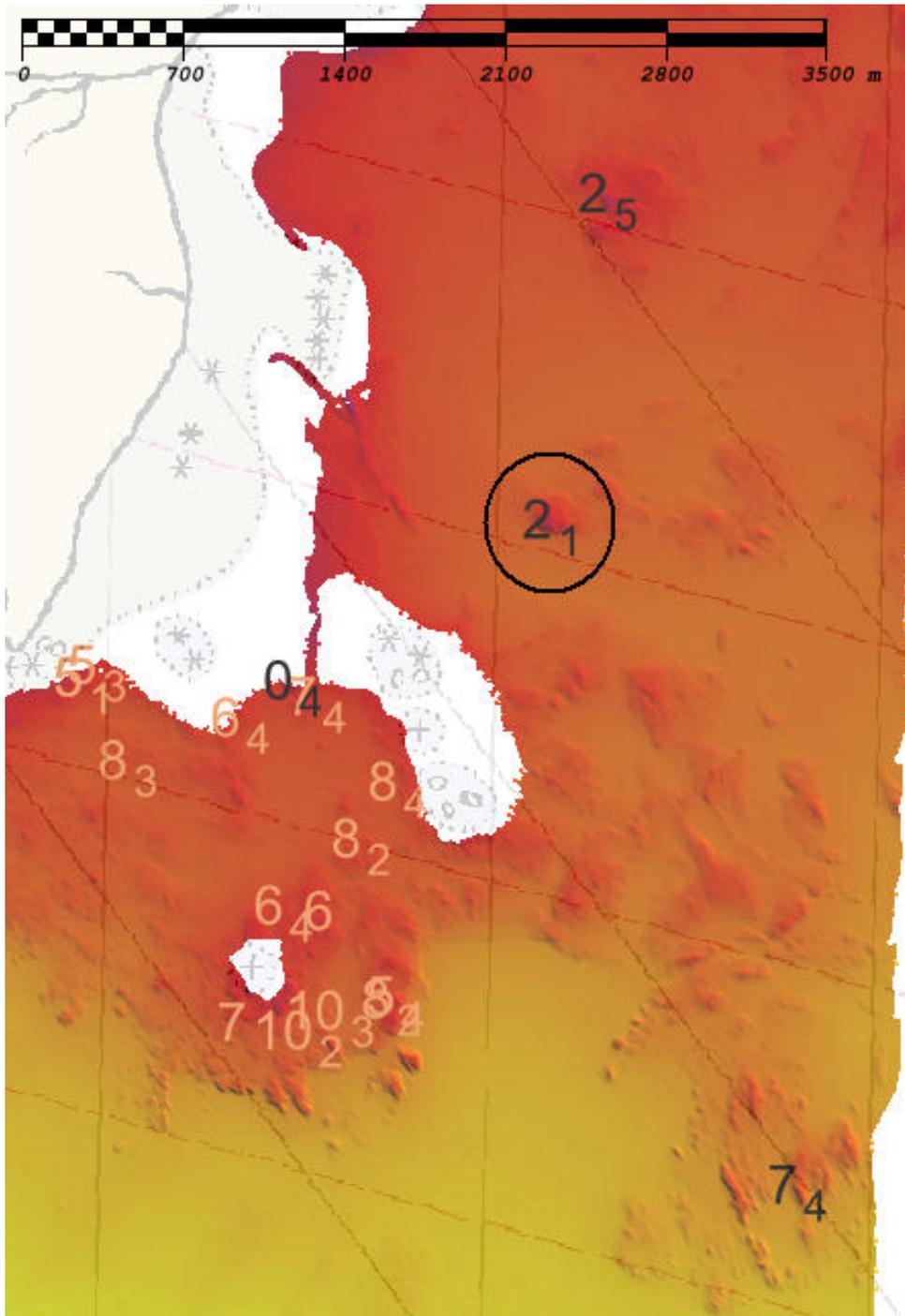


Figure 2.7.1

2.8) Profile/Beam - 229/369 from h12077 / 2804_reson7125_hf_512 / 2009-198 / 000_2340

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 13' 22.7" N, 161° 31' 32.6" W
Least Depth: 5.34 m (= 17.52 ft = 2.919 fm = 2 fm 5.52 ft)
TPU (±1.96σ): **THU (TPEh)** ±1.961 m ; **TVU (TPEv)** ±0.265 m
Timestamp: 2009-198.23:41:08.963 (07/17/2009)
Survey Line: h12077 / 2804_reson7125_hf_512 / 2009-198 / 000_2340
Profile/Beam: 229/369
Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

Uncharted 5.34 meter sounding.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12077/2804_reson7125_hf_512/2009-198/000_2340	229/369	0.00	000.0	Primary

Hydrographer Recommendations

DTON, Danger to Navigation.

Cartographically-Rounded Depth (Affected Charts):

2 ¾fm (16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 530_1)
 5.3m (500_1, 513_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: SORDAT - 20090804
 SORIND - US, US, nsurf, H12077
 VALSOU - 5.339 m
 WATLEV - 3:always under water/submerged

Feature Images

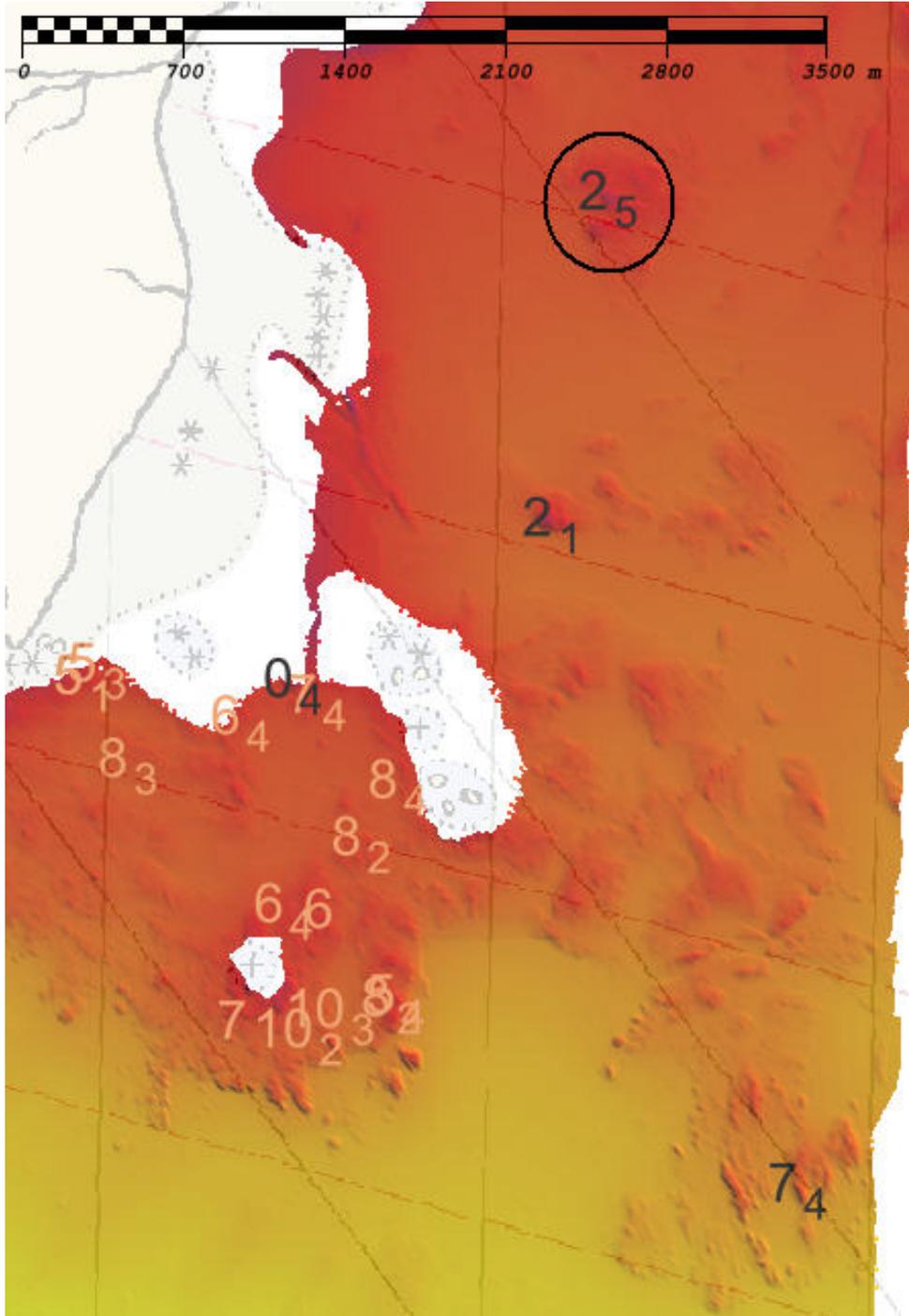


Figure 2.8.1

2.9) Profile/Beam - 5332/184 from h12077 / 2803_reson7125_hf_512 / 2009-173 / 000_1809

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 10' 40.4" N, 161° 34' 09.0" W
Least Depth: 46.81 m (= 153.58 ft = 25.597 fm = 25 fm 3.58 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** ± 1.986 m ; **TVU (TPEv)** ± 0.289 m
Timestamp: 2009-173.18:32:28.173 (06/22/2009)
Survey Line: h12077 / 2803_reson7125_hf_512 / 2009-173 / 000_1809
Profile/Beam: 5332/184
Charts Affected: 16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 500_1, 513_1, 530_1, 50_1

Remarks:

ANTI-DTON. Rock awash not found in bathymetry. However, survey H12079 submitted a DTON 1.2 just southwest of this charted awash rock.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12077/2803_reson7125_hf_512/2009-173/000_1809	5332/184	0.00	000.0	Primary

Hydrographer Recommendations

ANTI-DTON. Remove from chart.

Cartographically-Rounded Depth (Affected Charts):

25fm (16549_1, 16551_1, 16540_1, 16011_1, 16006_1, 530_1)

47m (500_1, 513_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: SORDAT - 20090804
 SORIND - US, US, nsurf, H12077

Feature Images

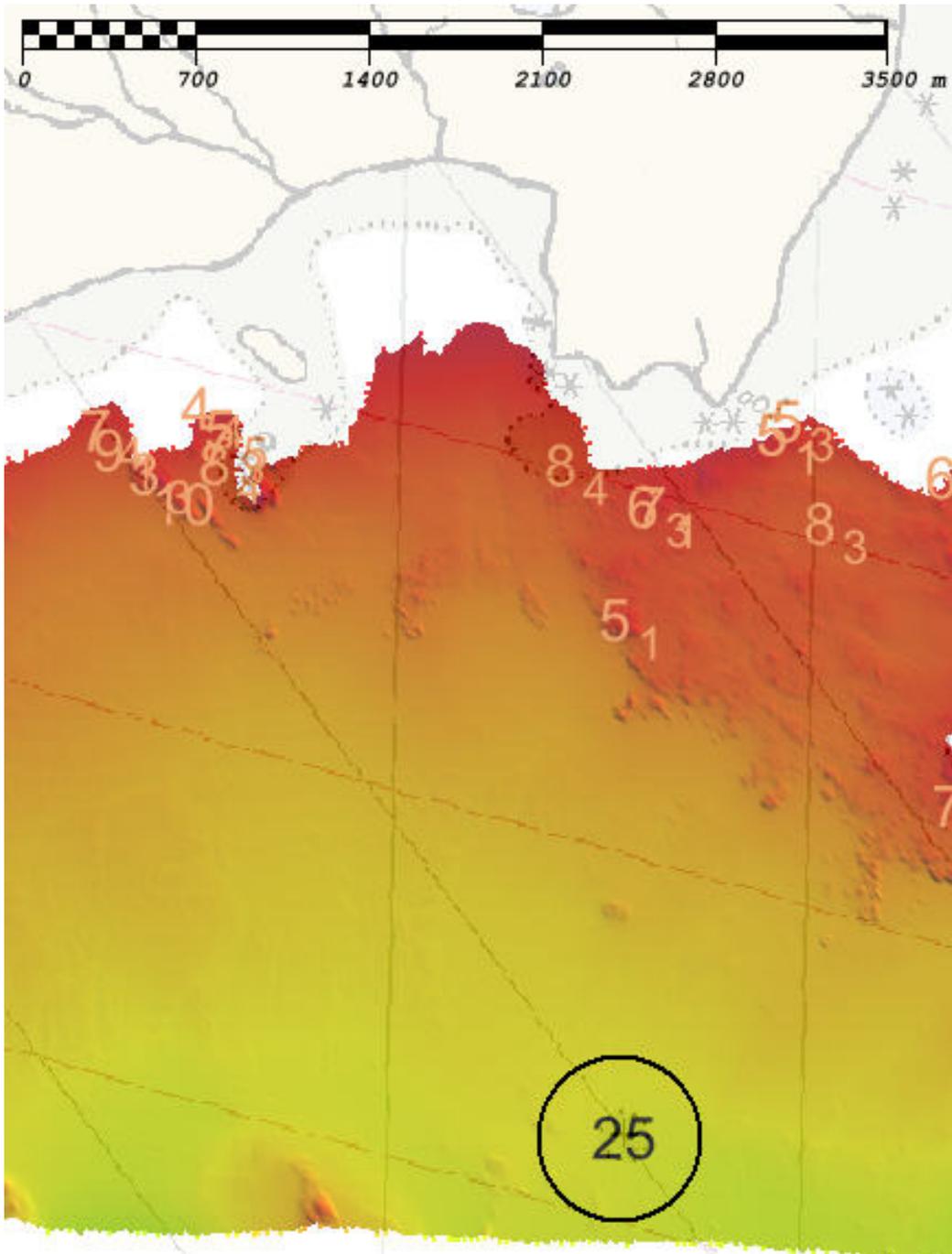


Figure 2.9.1



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : September 4, 2009

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P184-RA-2009
HYDROGRAPHIC SHEET: H12077

LOCALITY: East of Ukolnoi Island, AK
TIME PERIOD: June 18 - August 5, 2009

TIDE STATION USED: 945-9450 Sand Point, AK
Lat. 55° 19.9'N Long. 160° 30.3' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.988 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: SWA205

Refer to attachments for zoning information.

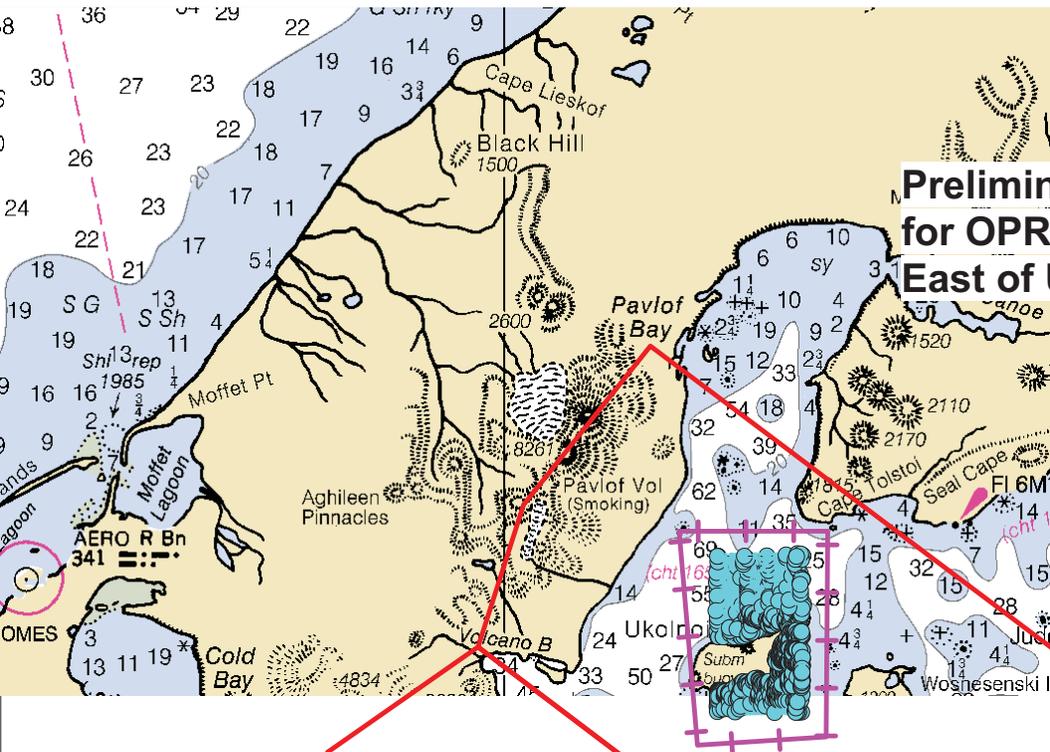
Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

Peter J. Stone

Digitally signed by Peter J. Stone
DN: cn=Peter J. Stone, o=CO-OPS, ou=NOAA/
NOS, email=peter.stone@noaa.gov, c=US
Date: 2009.09.11 15:35:43 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION





**Preliminary As Final Tidal Zoning
for OPR-P184-RA-2009 H12077
East of Ukolnoi Island, AK**



945-9450 SAND POINT

**SWA205
Time Corrector 0 mins.
Range Corrector x0.94
Reference 945-9450**

H12077 HCell Report
Katie Reser, Physical Scientist
Pacific Hydrographic Branch

1. Specifications, Standards and Guidance Used in HCell Compilation

HCell compilation of survey H12077 used:

Office of Coast Survey HCell Specifications: Draft, Version: 4.0, 17 March, 2010.
HCell Reference Guide: Version 2.0, 22 February, 2010.

2. Compilation Scale

Depths and features for HCell H12077 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NTM Date
16549	1:80,000	16 th	03/01/2010	05/22/2010
16551	1:80,000	10 th	04/01/2008	09/11/2010

The following ENC's were also used during compilation:

Chart	Scale
US4AK55M	1:80,000

3. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from an 8-meter multibeam combined surface in CARIS BASE Editor. A shoal-biased selection was made at 1:15,000 survey scale using a Radius Table file with values shown in the table, below.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
-5	10	3
10	20	4
20	50	4.5
50	500	5

In CARIS BASE Editor soundings were manually selected from the high density sounding layers (SS) and imported into a new layer (CS) created to accommodate chart density depths. Manual selection was used to accomplish a density and distribution that closely represents the seafloor morphology.

4. Depth Contours

Depth contours at the intervals on the largest scale chart are included in the *_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The metric and fathom equivalent contour values are shown in the table below.

Chart Contour Intervals in Fathoms	Metric Equivalent to Chart Fathoms, Arithmetically Rounded	Metric Equivalent of Chart Fathoms, with NOAA Rounding Applied	Fathoms with NOAA Rounding Applied	Fathoms with NOAA Rounding Removed for Display on H12077_SS.000
0	0.0000	0.2286	0.125	0
3	5.4864	5.715	3.125	3
5	9.144	9.373	5.125	5
10	18.288	18.517	10.125	10
20	36.576	37.948	20.750	20
30	54.864	56.2356	30.750	30
40	73.152	74.5236	40.750	40
50	91.44	92.812	50.750	50

With the exception of zero contours included in the *_CS file, contours have not been de-conflicted against shoreline features, soundings and hydrography, as all other features in the *_CS file and soundings in the *_SS have been. This may result in conflicts between the *_SS file contours and HCell features at or near the survey limits. Conflicts with M_QUAL, COALNE, DEPCNT and SBDARE objects should be expected. HCell features should be honored over *_SS.000 file contours in all cases where conflicts are found.

5. Meta Areas

The following Meta object areas are included in HCell H12077:

M_QUAL

The Meta area objects were constructed on the basis of the limits of the hydrography.

6. Features

Features addressed by the field units are delivered to PHB where they are de-conflicted against the hydrography and the largest scale chart. These features, as well as features to be retained from the chart and features digitized from the Base Surface, are included in the HCell. The geometry of these features may be modified to emulate chart scale per the HCell Reference Guide on compiling features to the chart scale HCell.

7. S-57 Objects and Attributes

The *_CS HCell contains the following Objects:

\$CSYMB	Blue notes
COALNE	GC coastline
DEPCNT	Zero contours
LNDARE	GC islets
LNDELV	Height on islet
M_QUAL	Data quality meta object
OBSTRN	Obstruction areas
SBDARE	Ledges, reefs, rocky seabed areas and bottom samples
SOUNDG	Soundings at the chart scale density
UWTROC	Rocks
WEDKLP	Kelp

The *_SS HCell contains the following Objects:

DEPCNT	Generalized contours at chart scale intervals
SOUNDG	Soundings at the survey scale density

8. Spatial Framework

8.1 Coordinate System

All spatial map and base cell file deliverables are in an LLDG geographic coordinate system, with WGS84 horizontal, MHW vertical, and MLLW (1983-2001 NTDE) sounding datums.

8.2 Horizontal and Vertical Units

DUNI, HUNI and PUNI are used to define units for depth, height and horizontal position in the chart units HCell, as shown below.

Chart Unit Base Cell Units:

Depth Units (DUNI):	Fathoms and feet
Height Units (HUNI):	Feet
Positional Units (PUNI):	Meters

During creation of the HCell in CARIS BASE Editor and CARIS S-57 Composer, all soundings and features are maintained in metric units with as high precision as possible. Depth units for soundings measured with sonar maintain millimeter precision. Depths on rocks above MLLW and heights on islets above MHW are typically measured with range finder, so precision is less. Units and precision are shown below.

BASE Editor and S-57 Composer Units:

Sounding Units:	Meters rounded to the nearest millimeter
Spot Height Units:	Meters rounded to the nearest decimeter

See the HCell Reference Guide for details of conversion from metric to charting units, and application of NOAA rounding.

9. Data Processing Notes

There were no significant deviations from the standards and protocols given in the HCell Specification and HCell Reference Guide.

10. QA/QC and ENC Validation Checks

H12077 was subjected to QA checks in S-57 Composer prior to exporting to the metric HCell base cell (000) file. The millimeter precision metric S-57 HCell was converted to chart units and NOAA rounding applied. dKart Inspector was then used to further check the data set for conformity with the S-58 ver. 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and warnings and errors investigated and corrected unless they are MCD approved as inherent to and acceptable for HCells.

11. Products

11.1 HSD, MCD and CGTP Deliverables

H12077_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:80,000
H12077_SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:15,000
H12077_DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H12077_Outline.gml	Survey outline
H12077_Outline.xsd	Survey outline

11.2 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 2.2	Creation of soundings and bathy-derived features, meta area objects, and blue notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer Ver. 2.0	Final compilation of the HCell, correct geometry and build topology, apply final attributes, export the HCell, and QA.
CARIS GIS 4.4a	Setting the sounding rounding variable for conversion of the metric HCell to NOAA charting units with NOAA rounding.
CARIS HOM Ver. 3.3	Perform conversion of the metric HCell to NOAA charting units with NOAA rounding.
HydroService AS, dKart Inspector Ver. 5.1	Validation of the base cell file.
Northport Systems, Inc., Fugawi Marine ENC Ver.3.1.0.435	Independent inspection of final HCells using a COTS viewer.

12. Contacts

Inquiries regarding this HCell content or construction should be directed to:

Katie Reser
Physical Scientist
Pacific Hydrographic Branch
Seattle, WA
206-526-6864
katie.reser@noaa.gov

APPROVAL SHEET
H12077

The survey evaluation and verification has been conducted according to branch processing procedures and the HCell compiled per the latest OCS HCell Specifications.

The survey and associated records have been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, S-57 classification and attribution of soundings and features, cartographic characterization, and verification or disapproval of charted data within the survey limits. The survey records and digital data comply with OCS requirements except where noted in the Descriptive Report and are adequate to supersede prior surveys and nautical charts in the common area.

I have reviewed the HCell, accompanying data, and reports. This survey and accompanying digital data meet or exceed OCS requirements and standards for products in support of nautical charting except where noted in the Descriptive Report.